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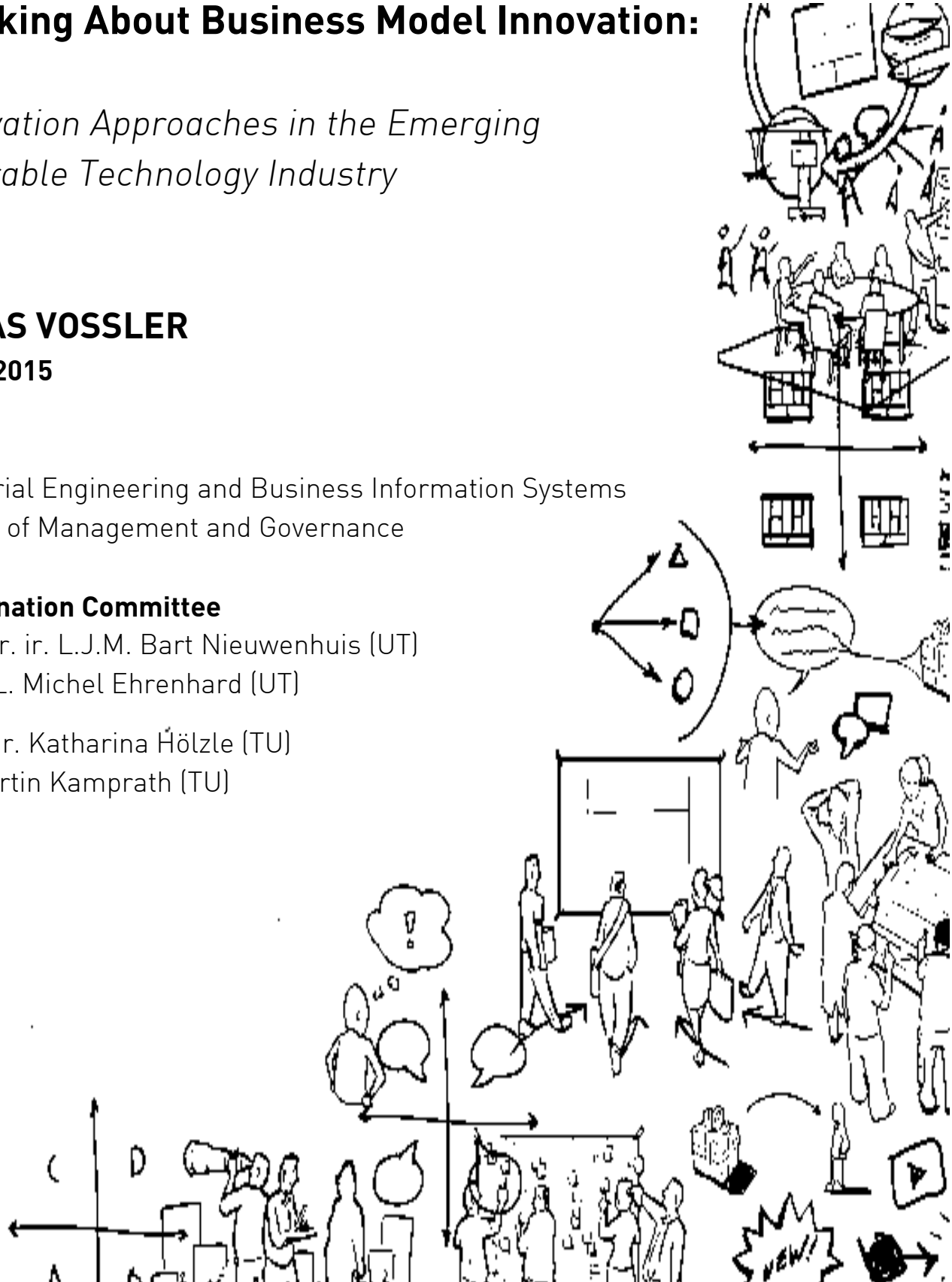
MASTER THESIS

Thinking About Business Model Innovation:

Innovation Approaches in the Emerging Wearable Technology Industry



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Gender Disclaimer

The use of the feminine gender ("she" / "her") in unspecific third person expressions throughout the entire thesis is only intended to lighten the authoring of the text and encompasses both genders.

Abbreviations & Acronyms

API	Application Programming Interface
BLE	Bluetooth Low Energy
B-MET	Business Model Environment Template
BYOWD	Bring Your Own Wearable Device
CeBIT	Centrum für Büroautomation, Informationstechnologie und Telekommunikation
CEO	Chief Executive Officer
cf.	*confer*, Latin word for "bring together"
cp.	c*ompare*, Latin word for "compare"
e.g.	*exempli gratia*, Latin word for "for example"
et al.	*et alii*, Latin word for "and others"
EU	European Union
FDA	Food and Drug Administration
GPS	Global Positioning System
HIPAA	Health Insurance Portability and Accountability Act
i.e.	*id est*, Latin word for "that is", "in other words"
IFA	Internationale Funkausstellung
IoT	Internet of Things
LED	Light-emitting Diode
LIPSOR	Laboratoire d'Investigation en Prospective Stratégie et Organisation
LTE	Long Term Evolution
LTE-A	Long-Term-Evolution-Advanced
MEMS	Microelectromechanical Systems
MICMAC	Matrice d'Impacts Croisés- Multiplication Appliquée à un Classement
NFC	Near Field Communication
PESTEL	Political, Economic, Social, Technological, Environmental, Legal
R&D	Research and Development
UK	United Kingdom
US	United States
USA	United States of America
UXD	User Experience Design
Wi-Fi	"Wireless Fidelity"
WiMAX	Worldwide Interoperability for Microwave Access

1 INTRODUCTION

1.1 Research Context

Wearable technology has come a long way since the first applications were introduced into the military space in the 1960s. For several decades, prominent consumer-technology companies such as IBM, Sony and Panasonic have engaged in the early experimental development of wearable technologies, attempting to attain a level of technological potential that would expedite mass-market penetration (Ranck, 2012, p. 6). However, until recently the commercialization of wearable technologies had been complicated by the limited availability and insufficient performance capabilities of enabling technologies as well as social and economic adoption barriers.

Today, wearable technologies are at the brink of breakthrough. Wearable manufacturers inherit the benefits of what technology theorist Chris Anderson has dubbed the "peace dividend of smart phone wars" (Wasik, 2013): Fierce competition on the market for mobile devices has fueled a host of innovations in technologies that power mobile computing. The pervasiveness of wireless networks (Wi-Fi, WiMAX, and LTE), advances in microelectronics and material science, improved efficiency of power consumption, and the advent of speech-, touch- or gesture-based human-machine interfaces pave the way for entirely new form factors. The wearable technology industry has now entered a "critical period" for adoption and acceptance (Pai, 2014) characterized by "furious experimentation" (Reed, 2013) and a "confusing mix of skepticism and hype" (Ballve, 2013).

While the market for wearables undoubtedly experiences a rapid growth phase, its long-term stability and attractiveness is yet to be proven. Despite the high level of **turbulence and uncertainty**, an increasing number of analysts expect the industry to finally take off and predict the diffusion of wearable technologies into the main stream over the next five years (Underwood, 2013). In its most recent report, BBC Research forecasts that the global wearable computing market will grow at a compound annual growth rate (CAGR) of 43.4% from around $5 billion in 2013 to $9.2 billion in 2014 and more than $30.2 billion in 2018 (Weigold, 2014). Wearable technology unveils the potential to disrupt a variety of different industries. While applications range from infotainment to the industrial and military sectors, health, sports and fitness applications are expected to be the key engine of growth in the early wearable devices market.

The wearable technology industry is in a **state of flux**. The future development of its business environment is still very uncertain, but stakeholders have to explore it proactively. In this tumultuous, ever changing and increasingly complex business environment, the big players of today are constantly endangered to suffer from obsolescence in the future. In order to occupy sweet spots and devise "blue ocean strategies" (cf. Kim & Mauborgne, 2005) in this emerging landscape, companies have to develop the capabilities to anticipate future directions, trends and dynamics in their industry and to take appropriate action. In their attempt to thrive in times of environmental turbulence and complexity, managers are challenged to **develop new and adapt existing business models** so as to act on altering consumer demands, market and competitive conditions, technological progress as well as political and regulatory changes (Giesen et al., 2009; Johnson et al., 2008; Bernd W Wirtz et al., 2010). But, particularly in this very dynamic and still emerging industry for wearable

technologies, executives have to cope with the **implementation paradox of business models** (cf. Kamprath & Glukhovskiy, 2014, p. 21), which describes the dilemma that, unlike products or services, the viability and feasibility of new business models cannot be tested before it is actually implemented in the market and subjected to customer feedback (Blank & Dorf, 2012; Cooper & Vlaskovits, 2013; Mullins & Komisar, 2009; Ries, 2011). This problem is particularly pressing **for early-stage entrepreneurial ventures**, which operate under resource constraints and with a high level of uncertainty. As a result, designing and changing business models in emerging markets constitutes a highly risky endeavor whose success is contingent upon a variety of drastic and yet uncertain environmental developments.

The challenge of innovating business models in response to environmental change has both **rational and cognitive underpinnings**: When creating new ventures, entrepreneurs scan their environment to identify business opportunities that are worth pursuing. They then conceive strategies to exploit the perceived opportunities and "develop implicit or explicit business models to help them make sense of and articulate those strategies" (Vargas & McCarthy, 2010, p. 1). In this sense, business models can be viewed as second-order constructs (cf. Magretta, 2002). Similar to strategies, which can be conceptualized as emerging perspectives in the form of concepts, maps, schemas, and frames (Mintzberg et al., 1984, p. 170), business models present a communicable reflection of how decision-makers translate inputs from the environment into actionable ideas. It follows that, particularly during the early, exploratory stage of business model innovation, managers of entrepreneurial ventures develop their firm's business models based on imperfect cognitive representations (Kringelum, 2015, p. 4). Such mental models of the environment, or **environmental frames** (see 2.4.2 Environmental Frames), are shaped by each manager's individual experiences, preferences, and other biases (T. S. Cho & Hambrick, 2006, p. 453); and this form of "bounded rationality" (cf. Cyert & March, 1963; March & Simon, 1958) ultimately influences how a manager approaches business model innovation in a given business environment.

By combining the strategic entrepreneurship perspective (cf. Ireland et al., 2001) and the cognitive school of strategy formation (cf. Mintzberg et al., 1984) and applying those to business models, this thesis aims to enhance the understanding of how managers of young entrepreneurial ventures approach business model innovation in emerging industries. The research, thereby focuses on managers' perceptions and interpretations of the business model environment and investigates the processes through which environmental conditions and events interact with business model design choices.

1.2 Justification for Research

While technology-driven innovations often produce novel and unique product or service offerings, the commercial success of innovation projects is critically affected by management's ability to develop business models that create and capture value from technology innovation (Chesbrough, 2003; Chesbrough & Rosenbloom, 2002; Doganova & Eyquem-Renault, 2009). In this context, the long-term prospects and survival of innovative business endeavors are highly contingent upon the extent to which management adapts to environmental alterations through the strategic renewal and

transformation of their firms' business models (Bernd W Wirtz et al., 2010). Consequently, designing and innovating business models that are viable and promising within the complex network of interconnected factors in a given external environment presents a major challenge for the management of innovation-oriented firms (Johnson et al., 2008; Korsten et al., 2008; M. Morris et al., 2005; Zott & Amit, 2010).

In emerging industries, such as the domain of wearable and mobile technologies, networks and services, the business environment is characterized by a high level of uncertainty and turbulence. In such complex and dynamic situations, decision-makers are aware of the fast pace of change but the vortex of uncertainties regarding technological, regulatory, societal, competitive and consumer-related forces erodes the basis for systematic decision-making (Şener, 2012, p. 170). In addition, industries that are still in their infancies lack established rules of collaboration and competition, that is their ecosystems and value chains are in a state of flux (Monfardini et al., 2012, p. 12). With insufficient clarity concerning the status quo, executives are well advised to prepare for tomorrow and anticipate how their firms can successfully create, deliver and capture value in the future. If firms operate in immature, high-velocity industries and hyper-competitive environments, engaging in business model experimentation and adaptation has proven particularly effective (e.g., Andries & Debackere, 2007; McGrath, 2010; Sosna et al., 2010). This is especially true for early-stage entrepreneurial firms that build their business models around novel, precarious technological trends (Singh et al., 2005). For such young ventures, there is a high degree of market and technology uncertainty, which makes it harder for managers to design a working business model at inception, let alone to a priori assess the viability and feasibility of business models conceived for the future (Andries & Debackere, 2007). It follows that, notably in emerging industries, any business model is provisional in nature. Its elements, hence, not only have to show internal consistency but also have to be designed with reference to the trajectory of market and technological development in the industry (Teece, 2010, p. 188). This also means that provisional business models should be constantly reassessed and changed in view of the current state of the business environment, but more importantly, against how it might evolve (Teece, 2010, p. 189).

Acknowledging the importance of business model innovation, scholars and practitioners are increasingly interested in the repercussions that environmental conditions have on how market actors design and change their business models. Strategic entrepreneurship research primarily examines the interdependencies of business models and the business environment on a conceptual level (Kamprath & Glukhovskiy, 2014) and derives rather general and abstract recommendations on how to incorporate conditions in the business environment into the business model design process. To that effect, current literature on business model innovation mainly presents descriptive narratives of how external environmental factors (e.g., customer needs, digitization) prompt managers to reconfigure the composition of some key elements of their business model (see 3.1 Environmental Factors and Business Model Innovation). Furthermore, a number of business model scholars have analyzed how the effectiveness of different approaches to business model innovation (e.g., renewal, adaptation, replication) is contingent upon various characteristics of, or conditions in, the business environment such as uncertainty or dynamism (see 3.2 Environmental Conditions and Business Model Innovation). Thus, the strategic entrepreneurship realm essentially incorporates the rational positioning, evolutionary learning, and environmental schools of strategy formation (cf. Mintzberg et al., 1984) and investigates

business model innovation either as a response to exogenous shocks or as a result of trial and error experimentation ensuing from environmental upheaval (Martins et al., 2015, pp. 100-102).
Another, often neglected, explanation of business model innovation originates from the cognitive school of strategic management, which regards strategy development as a mental process, based on individual perceptions (see 3.3 Managerial Cognition and Business Model Innovation). Accordingly, the nature of strategic responses to environmental changes was found to be significantly affected by strategists' subjective interpretations and perceptions of environmental conditions and events (e.g., Barr, 1998; Dutton & Jackson, 1987; Porac et al., 1989). Likewise, strategic decision-making is shaped by executives' attention to and recognition of specific areas of the environment (e.g., technology, regulation) (e.g., T. S. Cho & Hambrick, 2006; Eggers & Kaplan, 2009; Ocasio, 1997). While the relationship between managerial cognition, the business environment, and strategy adaptation is quite well explored in the field of strategic management, studies that apply this reasoning to business models are scarce. Recently, a few scholars started to research the interrelatedness of changing managerial cognitions and business model innovation (e.g., Kringelum, 2015; Martins et al., 2015) but business model research still offers little empirical insight into how managers assess and interpret important aspects of environmental change (Bernd W Wirtz et al., 2010, p. 273) and how critical conditions in the business environment induce innovations in the business models of their firms (De Reuver et al., 2009, p. 2). Also, although researchers widely agree on the importance of adaptability for entrepreneurial ventures in emerging markets, specific guidance on how to approach business model change in the face of environmental uncertainty and turbulence remains scant (Bernd W Wirtz et al., 2010, p. 273).
This thesis integrates the strategic entrepreneurship paradigm with the cognitive school of strategy to address these research gaps and further the understanding of the role of managerial cognition in business model innovation in emerging industries. Combining the industry structure view with the managerial cognition perspective has been argued to lead to a better and more complete understanding of strategic action (Nadkarni & Barr, 2008).

1.3 Research Purpose and Research Questions

Taking the identified research gaps as a starting point, a general research purpose is formulated:

The purpose of this thesis is to generate empirical insights into the interdependencies between industry context, managerial cognition, and business model innovation.

In doing so, the researcher seeks to explore how managers' subjective, cognitive representations (i.e. their assumptions, perceptions, and beliefs) of the business environment impact their approaches to business model innovation. With a focus on early-stage entrepreneurial ventures in the emerging wearable technology industry, the research context allows for a distinct exploration of business model innovation under conditions of great uncertainty and dynamism.

Based on these research goals, the following broad research questions are derived:

RQ 1: *How do managers of entrepreneurial ventures in the emerging wearable technology industry take into account the business environment when designing their firms' business models?*

RQ 2: *How do managers of entrepreneurial ventures approach business model innovation in the emerging wearable technology industry?*

1.4 Research Design

This thesis employs a cross-sectional, embedded case study design, in which the wearable technology constitutes a single case, representative of emerging industries in the early phases of the industry life cycle. In a multi-method exploratory approach, this thesis uses different qualitative data collection and analysis techniques that incorporate both deductive and inductive reasoning. The two-step research process (see 4.2 Research Process) combines the scenario method (see 4.3 Scenario Method) with semi-structured qualitative interviews (see 4.4 Qualitative Interviews).
The research process is guided by van der Heijden's pragmatic approach to scenario-based strategy development (Van der Heijden, 2005, pp. 53-62). The scenario building process is largely inspired by Peter Schwartz's intuitive approach to scenario analysis but also integrates a quantitative, systematic influence analysis as suggested by von Reibnitz (1992). The scenario analysis draws on desk research to explore focal issues, trends in the wearable technology industry. Through systematic categorization, open coding and axial coding (cf. Corbin & Strauss, 1990) a list of driving forces was extracted from the trend data. The influence analysis was supported by the MICMAC software tool provided for free by the LIPSOR Institute (Laboratoire d'Investigation en Prospective Stratégie et Organisation). The influence and system grid analysis helped to reduce data complexity and resulted in the identification of a reduced number (12) of key driving forces. These driving forces were assessed in an expert discussions to ascertain the scenario logics and flesh out 2 scenarios. In consultation with the expert, one scenario narrative was chosen to serve as the basis for the vignettes used in the qualitative interviews.
For the exploration of the main research questions, 6 qualitative, semi-structured skype interviews were conducted with founders and managers of entrepreneurial ventures in the wearable technology space. The interviews combined open-ended questions with a vignette exercise in which the participants were asked to discuss the potential impact of specific environmental changes on their business models.
The analysis of the interview data was conducted following the procedures of qualitative content analysis (Mayring, 2002, pp. 114-120). Specifically, a combination of deductive category assignment and inductive category development was used to first structure the material thematically and then classify the pre-structured material into different types of business model innovation approaches in the emerging wearable technology industry ("type-building") and to describe them.

1.5 Definitions and Delimitations

1.5.1 Wearable Technology

Wearable technology broadly refers to any electronic device or product that can be worn on the user's body for an extended period of time to integrate computing in his daily activity or work and use technology to avail advanced features and characteristics (cf. Salgarkar, 2014; Walker, 2013). After being utilized in the military for decades, technological advances have brought down production costs of wearable devices to a point where it is financially feasible for OEMs to target the consumer market. As the application of wearable technology now comes in numerous different configurations and shapes, such devices "fall squarely in the nexus of the four pillars that IDC has identified as driving technological innovation: Big Data/analytics, cloud, mobility, and social" (Gaw, 2013). This thesis understanding of wearable technology comprises the entire range of products and services that fulfill the following main criteria:

1. They are ***wearable***, i.e. being worn for an extended period of time, with the user experience significantly enhanced as a result.
2. They are ***smart***, i.e. having advanced circuitry, wireless connectivity and independent processing capability. (Walker, 2013)

Given the current state of technology development, wearable technologies mostly assume the form of *wearable* or *body-borne computers*. These, often app-enabled, miniature electronic devices are worn by the bearer under, with or on top of clothing and enable hands-free mobile real-time data monitoring and wireless networking (Bhas, 2013; Cumming, 2014; Mann, 2014; Salgarkar, 2014).
This research explores the dynamic development of business models built around products and services that meet the aforementioned criteria and feature the basic characteristics of wearable technology as described above.

1.5.2 Emerging Industries

For this thesis, an industry is defined as "a set of firms producing closely-substitutable products" (Forbes & Kirsch, 2011, p. 591). Similar to individual firms or products, industries experience life cycles during which they face varying challenges as they pass through different developmental stages (e.g., Abernathy & Utterback, 1978; Michael E. Porter, 2004, pp. 156-190). Within these traditional life cycle models, the concept of industry emergence is interpreted as a temporal interval that starts with the inception of an industry ("introduction") and extends at least into the beginning of an industry's "growth" stage or even into later stages ("maturity") (Forbes & Kirsch, 2011, p. 591).
In an attempt to identify and classify emerging industries, Monfardini et al. (2012) have conceptualized an industry life cycle model that specifically incorporates the notion of emerging industries and consists of 4 stages: Developing, Emerging, Mature, and Declining. According to the authors, the emerging stage is primarily characterized by a vast growth potential. While the actual growth rates in emerging industries might still be lower than those in other industries in the growth phase, the majority of growth

potential is yet to be realized. Besides the growth potential, emerging industries exhibit a number of key characteristics (cf. Monfardini et al., 2012, pp. 10-13):

- They are often formed on the basis of a new product, service or idea that react to changes in the business environment (e.g., changing consumer needs, technological advancements, socio-economic change).
- Their emergence is mostly accompanied by the development of key enabling technologies and new business models.
- They are marked by a high degree of uncertainty, particularly regarding product demand, growth potential, market conditions, and the competitive landscape.
- Emerging industries are either built around new sectors, or around restructured sectors that transform, evolve or merge into new industries through cross-sector spillovers.
- In emerging industries, value chains are likely to be in a state of flux as disruptive ideas trigger and enable structural change in the market.
- They are research and knowledge intensive and are driven by an entrepreneurship and innovative spirit.
- They have a high propensity to cluster, i.e. agglomerate geographically.

1.5.3 Entrepreneurial Ventures

The entrepreneurship realm is deeply rooted in the Schumpeterian notion of "creative destruction" which he defines as the "process of industrial mutation [...] that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Schumpeter, 2013, p. 83). Schumpeter, argues that the process of creative destruction is "the essential fact about capitalism" (ib.) because only the constant disruption by innovative entrepreneurs drives sustained economic growth and thus ensures the continuity of the capitalist system. Samli (2009, p. 19) takes up the concept of creative destruction as he regards entrepreneurship as a form of "constructive creationism". This understanding emphasizes "opportunities or situations that entail the discovery of means–ends relationships through which new goods, services, procedures or organizations are introduced to generate economic value for the company and society" (ib.). Thus, entrepreneurial ventures are mainly characterized by their distinct propensity to detect and exploit opportunities. According to Samli (2009, pp. 19-25), entrepreneurial opportunities generally emerge from three situations:

1. The entrepreneur seeks to improve current economic conditions that result from market imperfections (e.g., flawed pricing, information asymmetry).
2. The entrepreneur seeks to capture the economic potential of a country or region by thinking beyond the current economic conditions, actively creating revolutionary solutions (new products or services), and developing new industries.
3. The (social) entrepreneur engages in "active desperation" to create innovative, cost- effective, and sustainable ways to solve social problems.

Furthermore, the definition of entrepreneurial ventures used in this thesis is closely linked to the organizational form of startup firms. Such new ventures are still in the early phase of (e.g., creativity) of organizational evolution (Greiner, 1998). In this *birth* stage of an organization, the entrepreneur is primarily concerned with creating a product and a market. Greiner (1998, p. 60) lists a number of managerial characteristics that are typical for this period of "creative evolution":

- The founders of the company are usually technically or entrepreneurially oriented and expend their entire mental and physical capacity on making and selling a new product or service.
- Communication among employees is frequent and informal.
- Long hours of work and small salaries are compensated with ownership privileges.
- The firm's strategic direction is strongly shape by marketplace changes and customer feedback.

In addition to that, a number of authors from a new stream of research in the field of entrepreneurial management emphasize the factor of uncertainty and resource scarcity inherent in the environment of startups. Accordingly, Ries (2011, p. 34) defines a startup as "an organization designed to create new products and services under conditions of extreme uncertainty". Likewise, Eisenmann et al. (2012, p. 1) posit that startups face uncertainty about "whether they can mobilize the additional resources required to make and sell a new product" and "about demand for the new product they envision". Taking a business model perspective, Blank & Dorf (2012, p. xvii) describe a startup as "the temporary organization used in search of a scalable, repeatable, profitable business model" (p. xvii). They further argue that only after a startup has discovered a working business model, it can transition into a large company that executes and scales the business model.

1.6 Outline of the Thesis

Following the introductory part, section two describes the theoretical background in great detail. The theory section of this thesis covers the topics of business models, business model environments, and business model innovation quite comprehensively to then integrate these theoretical considerations into a conceptual framework for business model innovation in emerging business environments (see 2.3 A Conceptual Framework for Business Model Innovation in Emerging Business Environments). Section 2.4 specifically focuses on the cognitive perspective on business models and business environments. In section three, a literature review provides an overview of how the main research questions of this thesis have been addressed in existing literature. The structure of the literature review is guided by the conceptual framework and theoretical issues discussed in the second section. Section four describes the methodology used to answer the research questions. Subsequently, the fifth section presents the shortened results of the scenario analysis, featuring the description of key driving forces in the wearable technology industry as well as the narrative of the "Vortex of Change" scenario, which was selected to be used as part of a vignette exercise during the primary data collection. Section six presents the research results. In the result

section, "Defensive Evolution" and "Proactive Adaptation" are outlined as two distinct business model innovation approaches that managers of entrepreneurial ventures pursue in the wearable technology industry. Finally, section seven concludes the thesis by summarizing the key research findings, formulating theoretical propositions and pointing out contributions, methodological limitations and avenues for future research.

2 THEORETICAL BACKGROUND

2.1 Business Models and Innovation

2.1.1 From Strategy to Business Models

During the mid-1990s, first strategic management scholars started to discover the business model concept as a new way to "illustrate a firm's core logic for creating and capturing value as well as the mechanisms underlying this logic" (Hacklin & Wallnöfer, 2012, p. 167). The appearance of the term business model in academic literature is a relatively young phenomenon. Since the business model concept has its origins in the field of information technology (IT), its diffusion into the mainstream experienced a strong boost during the internet hype at the beginning of the 21st century (Osterwalder et al., 2005).
Despite the popularity of the term, a review of the literature shows a broad diversity of understandings and usages of the term business model. Peter Drucker, who often is referred to as one of the most influential management thinkers, counts among the first to introduce the concept of the business model as early as in the 1950s. Drucker challenged entrepreneurs to answer five important questions that underlie the development of a viable business model (Drucker et al., 2008):

- What is our mission?
- Who is our customer?
- What does our customer value?
- What are our results?
- What is our Plan?

Throughout the evolution of the business model concept in entrepreneurship literature, Drucker's five questions have been guiding the research of numerous scholars who attempted to define business models from a diverse array of different perspectives (e.g., Amit & Zott, 2001; Osterwalder, 2004; Timmers, 1998; Weill & Vitale, 2001). Addressing the diversity of definitions and usage of the term business model, Osterwalder (2004) suggests the following working definition that encompasses most of the aspects covered in business model literature:

> *"A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams."* (Osterwalder, 2004, p. 18).

Magretta (2002) argues that the terms *business model* and *strategy* are often poorly defined and highlights the necessity of drawing a clear line between the two concepts. The author differentiates between business models and strategy by indicating that "business models describe, as a system, how the pieces of a business fit together, but do not factor in one critical dimension of performance, usually competition, as strategy does" (Magretta, 2002, p. 6). Studying how business models respond to the real world, Stähler (2002) generally establishes that a model is always a simplification of a complex reality. Consequently, a business model can be regarded as "an abstraction that describes a business not at the operational level, but at the conceptual level" (Cavalcante et al., 2011, p. 1328). Likewise, Seddon & Lewis (2003) consider the level of abstraction to be the main difference between business model and strategy. They conclude that a business model is an abstract representation of some aspect of a firm's strategy. It outlines the essential details one needs to know to understand how a firm can successfully deliver value to its customers. This view incorporates the notion that a strategy is always specific to a particular firm and that strategy takes account of the particular competitive environment of that one firm, while a business model may potentially apply to an unspecified number of firms (Seddon & Lewis, 2003, pp. 236-238).

Osterwalder (2004) analyzed the role and place of business models in the firm and came to the conclusion that the business model is the missing link between strategy and business processes. Osterwalder models the relationship between strategy, organization and systems by using the concept of a business triangle that is constantly subjected to external pressures such as competitive forces, social change, technological change, customer opinion and legal environment (see Figure 1).

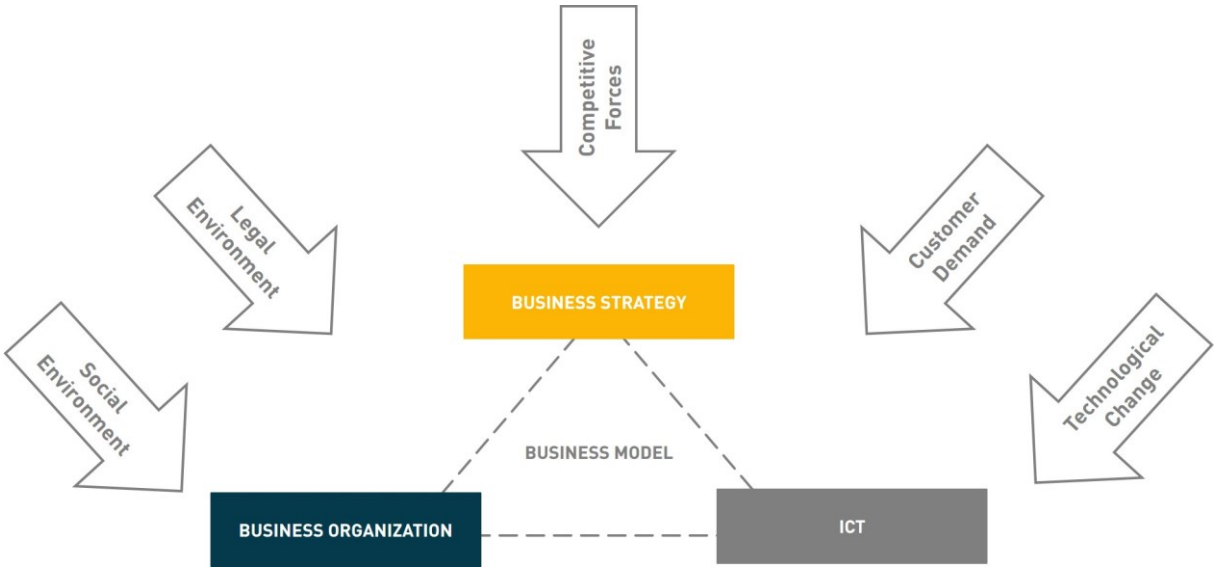

Figure 1: The role of the business model in the firm (adopted from Osterwalder, 2004, p. 16)

Thus, he regards the business model as a "conceptual and architectural implementation of a business strategy and the foundation for the implementation of business processes and information systems" (Osterwalder & Pigneur, 2002, p. 2). In

other words, the business concept translates the vision and strategy of the company into a "money earning logic" (Osterwalder, 2004, p. 17), i.e. value propositions, customer relations and value networks, which facilitates the strategy execution via business processes related to business organization and information and communication technology. In this sense, Osterwalder concludes that strategy, business models and processes address similar problems but on different *business layers* (see Figure 2).

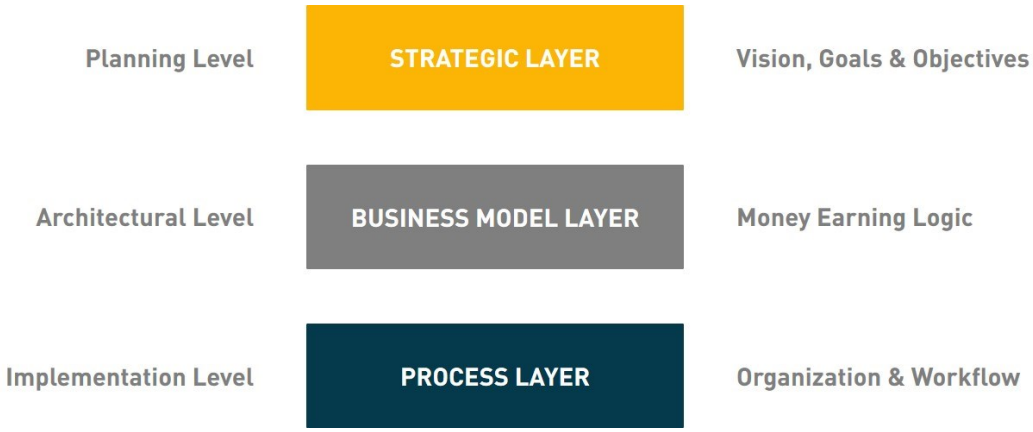

Figure 2: Business Layers (adopted from Osterwalder, 2004, p. 14)

2.1.2 Business Model Design

Business model design complements conventional strategic management instruments with a more flexible, concise and communicable representation of a firm's value creation and value capturing elements and activities. In business model design literature, it is a widely accepted notion that business models should be analyzed through a multi-category approach that emphasizes the core design aspects (Ghezzi et al., 2010). It should be noted that there is a significant inconsistency concerning the terms used to describe the parts that configure a business model. Today, an array of different terms is used interchangeably in business model literature. Those include *vectors* (N Venkatraman & Henderson, 1998), *functions* (Chesbrough & Rosenbloom, 2002), *dimensions* (Schweizer, 2005), *elements* (Yip, 2004), and *components* (Osterwalder & Pigneur, 2010). In addition to that, the existing body of knowledge also shows a lack of homogeneity regarding the essential dimensions, elements or business model components (Johnson et al., 2008). With his Business Model Ontology, Osterwalder (2004) has outlined a single reference model based on the similarities of a wide range of business model configurations. Based on the ontology, Osterwalder & Pigneur (2010) have developed the *Business Model Canvas* (see Figure 3) – an analysis tool that equips entrepreneurs with a "shared language for describing business models" (Osterwalder & Pigneur, 2010, p. 13) and helps managers "to capture, understand, communicate, design, analyze, and change the business logic of their firm" (Osterwalder & Pigneur, 2010, p. 19). Inspired by the Balanced Scorecard approach (cf. R. S. Kaplan & Norton, 1996), the Business Model Canvas emphasizes the four areas of product, customer interface, infrastructure management and financial aspects that every business model has to address. Furthermore, Osterwalder & Pigneur (2010) identify nine essential *building blocks* of customer segments, value proposition,

channels, customer relationships, revenue streams, key resources, key activities, key partnerships, cost structure that form a meta-business model (Osterwalder & Pigneur, 2010, pp. 16-42):

- **Customer Segments:** "The Customer Segments Building Block defines the different groups of people or organizations an enterprise aims to reach and serve" (Osterwalder & Pigneur, 2010, p. 20).
- **Value Proposition:** "The Value Propositions Building Block describes the bundle of products and services that create value for a specific Customer Segment" (Osterwalder & Pigneur, 2010, p. 21).
- **Channels:** "The Channels Building Block describes how a company communicates with and reaches its Customer Segments to deliver a Value Proposition" (Osterwalder & Pigneur, 2010, p. 26).
- **Customer Relationships:** "The Customer Relationships Building Block describes the types of relationships a company establishes with specific Customer Segments" (Osterwalder & Pigneur, 2010, p. 28).
- **Revenue Streams:** "The Revenue Streams Building Block represents the cash a company generates from each Customer Segment (costs must be subtracted from revenues to create earnings)" (Osterwalder & Pigneur, 2010, p. 30).
- **Key Resources:** "The Key Resources Building Block describes the most important assets required to make a business model work" (Osterwalder & Pigneur, 2010, p. 34).
- **Key Activities:** "The Key Activities Building Block describes the most important things a company must do to make its business model work" (Osterwalder & Pigneur, 2010, p. 36).
- **Key Partnerships:** "The Key Partnerships Building Block describes the network of suppliers and partners that make the business model work" (Osterwalder & Pigneur, 2010, p. 38).
- **Cost Structure:** "The Cost Structure describes all costs incurred to operate a business model" (Osterwalder & Pigneur, 2010, p. 40).

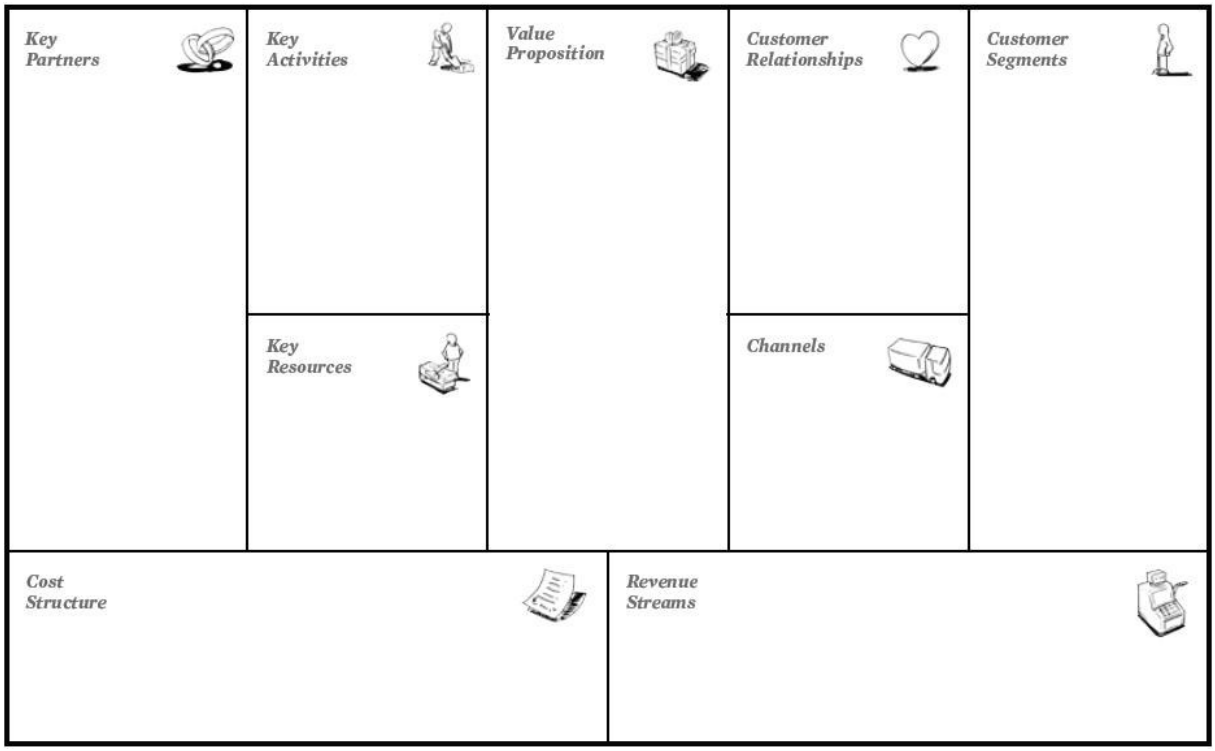

Figure 3: Osterwalder's Business Model Canvas (Osterwalder and Pignuer, 2010, p. 44)

2.1.3 The Business Model as a Tool for Strategy Analysis

Osterwalder's theories on business model design combined with the Business Model Canvas as their practical application can be employed as a tool for supporting strategy analysis of firms, particularly in young entrepreneurial firms. In recent years, more and more scholars and managers recognize the value of business models as a unit of analysis for strategizing and as a tool for planning, controlling and innovation (e.g., Hacklin & Wallnöfer, 2012; McGrath, 2010; Osterwalder & Pigneur, 2010; Stähler, 2002). Cavalcante et al. (2011) view the business model as a "systematic analytical device, partly for evaluation and action" (Cavalcante et al., 2011, p. 1328). What is more, a stream of research asserts that business models allow for an approach to analyzing firms that offers superior value than widely adapted units of analysis such as the industry or the business unit (e.g., Chesbrough, 2007; Magretta, 2002; Zott & Amit, 2007). In this context, McGrath (2010) underlines the benefit of integrating the business model concept into the strategic planning process of emerging firms, such as entrepreneurial ventures who are forced to consider their options and evaluate threats and opportunities in uncertain, fast-moving and unpredictable environments. The flexibility inherent in the nature of the business model concept takes account of the notion that a firm's strategic actions cannot be anticipated in advance because they are predicated on assumptions rather than solid knowledge. The "hypothesis nature" of business models implies that they enable a discovery-driven planning approach that primarily rests upon insight, rapid experimentation and evolutionary learning. This dynamic perspective essentially contradicts the conventional analytical and prescriptive planning model (McGrath, 2010). Besides its novel perspective on the strategy process, a business model is characterized by the interdependent nature of its

constituting elements, often referred to as the components of the business model (cf. Linder & Cantrell, 2000; Osterwalder et al., 2005; Stähler, 2002). The business model components perspective is of particular importance for understanding the consequences of strategy adaptation, since a change in one component has lasting effects on the overall business model (Hacklin & Wallnöfer, 2012). Considering its dynamic nature and the interrelatedness of its components, the business model concept is not only useful to model the current strategy of a firm but also provides a framework for innovating and discovering new business models in response to environmental changes. While the body of literature that explores theoretical aspects of business model dynamics has grown into a sizeable research foundation, only a few researchers are committed to developing practicable methodologies that incorporate extant theoretical knowledge to help executives successfully develop and adapt business models in the face of permanently changing competitive environments. The majority of such business model change methodologies include a number of analytical steps and actions that support decision-makers in improving the current business model to one that is more consistent with changing environmental conditions (e.g., Papakiriakopoulos & Poulymenakou, 2001; Petrovic et al., 2001; Pramataris et al., 2001; Tapscott et al., 2000; Vlachos et al., 2006). While internally coherent, the applicability of methodologies has for the most part only been tested in specific contexts such as the transformation of eBusiness business models (cf. Papakiriakopoulos & Poulymenakou, 2001; Petrovic et al., 2001) or the facilitation business model change under the influence of digital interactive television in the advertising industry (cf. Pramataris et al., 2001).
In order to improve decision-makers' ability to anticipate future developments and their impact on elements of their business models, several studies have combined knowledge from dynamic business model design and futures studies to develop business model alternatives based on different types of scenarios (e.g., Bouwman et al., 2005; Chanal & Caron-Fasan, 2007; Chesbrough et al., 2013; Grienitz et al., 2009; Pateli & Giaglis, 2005). Some of these approaches involve the identification of different scenarios that represent possible accounts of future environmental circumstances. Subsequently, the analyst gauges the potential effect of the projected environmental changes on a focal firm's business strategy and business model and conceives alternative business models that he deems consistent with the peculiarities of a given future scenario. Extant research validates scenarios as valuable tool for strategy design in turbulent and complex business environments (Pateli & Giaglis, 2005).
Conventional prescriptive strategic planning approaches suffer from a mismatch between the uncertainty that new ventures face and the knowledge its planning systems assume it possesses (McGrath, 2010). The business model concept has the capability to enrich traditional strategic management processes and the static business plan by providing a more dynamic, flexible and comprehensive planning perspective for entrepreneurial firms.

2.1.4 Business Model Dynamics and Innovation

The early stages of business model research were mainly concerned with the conceptualization of business models and its various components (e.g., Amit & Zott, 2001; Osterwalder et al., 2005) as well as with the innovation potential of business models (cf. Chesbrough & Rosenbloom, 2002). However, this predominantly static view on business models does not meet the requirements of today's highly competitive,

dynamic and turbulent business environment. Instead, more recent business model literature emphasizes the importance of dynamic and adaptive business modeling for firm success (e.g., McGrath, 2010; Singh et al., 2005; Sosna et al., 2010; Teece, 2010). Thus, firms that display "superior ability and willingness to reinvent and innovate new business models" (Najmaei, 2011, p. 166) are better positioned to develop a sustainable competitive advantage (Chesbrough, 2007; Demil & Lecocq, 2010; Doz & Kosonen, 2010; Johnson et al., 2008; Voelpel† et al., 2004). Consequently, a number of business model scholars have urged practitioners and academics to ascribe more importance to the area of business model dynamics (e.g., Chesbrough & Rosenbloom, 2002; Pateli & Giaglis, 2004; Zott & Amit, 2007).

Answering the call, a few scholars have explored the nature of different types (e.g., Demil & Lecocq, 2010; Doz & Kosonen, 2010; McGrath, 2010; Teece, 2010) or approaches (e.g., Andries & Debackere, 2007, 2013) of business model change and how it affects firm performance (cf. Chesbrough, 2010; Voelpel† et al., 2004). One research stream, for example, investigates the specific nature of the managerial processes through which firms adapt and develop new business models. Thereby, scholars suggest different business model adaptation strategies (cf. Andries & Debackere, 2007) or learning approaches (cf. Andries & Debackere, 2013) such as *commitment*, *incremental experimentation*, or *radical experimentation* and analyze how contingency factors such as experience effects, complexity, and ambiguity affect the effectiveness of these approaches. A number of authors emphasize the iterative and experimental nature of the business model change process. M. Morris et al. (2005, p. 733), for example, describe business model development as a "process of trial and error" that leads to the delimitation of future directions. On that note, the evolution of business models can be portrayed as a series of permanent adjustments and experiments. In this process, managers continuously develop a "set of relations and feedback loops between variables and their consequences" (Casadesus-Masanell & Ricart, 2010, p. 199) that strengthen some business model components at every iteration and ideally emerge into "virtuous circles" for superior value creation and capturing.

Nevertheless, extant literature on business model dynamics is still very inconsistent in their use of different terms to describe the transition from a current to a future business model. As a result, various notions such as "renewal" (Doz & Kosonen, 2010; Linder & Cantrell, 2000), "transformation" (Aspara et al., 2013), "augmentation", "extension" (Linder & Cantrell, 2000) or "evolution" (Demil & Lecocq, 2010; M. Morris et al., 2005) are often used interchangeably to describe business model change, even though they have different meanings. Saebi (2014) synthesizes the various definitions in literature by delineating three distinct types of business model change processes based on their planned outcome, scope of change, degree of radicalness, frequency of change, and degree of novelty (see Table 1): The first type, called business model evolution denotes a "fine tuning process involving voluntary and emergent changes in and between permanently linked core components" (Demil & Lecocq, 2010, p. 239). Business model adaptation (cf. Doz & Kosonen, 2010; Sosna et al., 2010; Teece, 2010), the second type, can be defined as "the process by which management actively aligns the internal and/or external system of activities and relations of the business model to a changing environment" (Saebi, 2014, p. 149). While business model adaptation implies a process of continuous alignment, the third type, business model innovation, aims at creating "disruptive innovation in response to environmental dynamics" (Saebi, 2014, p. 149).

	Business Model Evolution	Business Model Adaptation	Business model Innovation
Planned Outcome	Natural, minor adjustments	Align with the environment	Disrupt market conditions
Scope of Change (areas affected)	Narrow	Narrow - wide	Wide
Degree of Radicalness	Incremental	Incremental - radical	Radical
Frequency of Change	Continuous, gradual changes	Periodically	Infrequently
Degree of Novelty	Not applicable	Novelty is not a requirement	Must be novel to the industry

Table 1: Business Model Evolution, Adaptation and Innovation (adopted from Saebi, 2014, p. 151)

In this thesis, the 3 broad types of business model change (evolution, adaptation, innovation) and the dimensions proposed by Saebi (2014) serve as a conceptual lens when analyzing managers' approaches to business model change in uncertain, emerging business environments.
While business model change can be initiated by altering any given component of a firm's business model, business model scholars have attempted to categorize business model changes based on which components serve as the starting point of business model innovation (e.g., Giesen et al., 2009; Osterwalder et al., 2005; Singh et al., 2005). Singh et al. (2005) list 13 types of changes that broadly relate to two dimensions of firm behavior: 1) its product market and 2) its external relationships (p.632). Moreover, ensuing from the business model canvas, Osterwalder & Pigneur (2010, pp. 138-139) distinguish four "epicenters of business model innovation": resource-driven, offer-driven, customer-driven, and finance-driven. Depending on the nature of the change process, each epicenter can significantly impact all other eight building blocks and sometimes business model change originates from several epicenters simultaneously (multiple-epicenter driven). In the same vein, Giesen et al. (2009) observe that successful companies typically adapt their business models to changing conditions in three ways:

1. **Revenue model innovation:** Innovate how the company makes money by changing the value proposition (product/service/value mix) and the pricing model.
2. **Industry model innovation:** Redefine an existing industry, move into a new industry or create an entirely new one.
3. **Enterprise model innovation**: Innovate the way the organization operates, rethinking the organizational boundaries of what is done in-house and what is done through collaboration and partnering. (Giesen et al., 2009, p. 3).

2.2 Business Model Environments

2.2.1 Conceptualizing the Business Model Environment

In their nature of open systems (cf. Berglund & Sandström, 2013), business models are inevitably embedded in the context of the environment they interact with. Thus, for entrepreneurial and incumbent firms alike, monitoring and analyzing the business environment is of crucial importance in order spot "clues for designing, changing, and refining their business models" (Kijl et al., 2005, p. 5). The concept of the business environment has been examined through various different theoretical lenses, including strategic management (e.g., Andrews, 1971; Michael E. Porter, 2004), organizational (e.g., Dill, 1958) and institutional theory (e.g., DiMaggio & Powell, 1983). In strategic management, the environment of an organization is understood as "the pattern of all the external conditions and influences that affect its life and development" (Andrews, 1971, p. 48). Such influences mainly include external factors related to the political, economic, socio-cultural, technological, ecological, and legal dimensions of the business environments (PESTEL Framework) (cf. Andrews, 1971; Fahey & Narayanan, 1986). These environmental dimensions span the broader *macro-environment* of the firm and, hence, their dynamic influences organizational decisions across industries (Ginter & Jack Duncan, 1990, p. 91). The analysis of macro-environmental influence factors informs management's decision making regarding their firm's current strategic positioning, but also serves as the basis for strategic foresight and long-range planning. In order for firms to prepare for change and maintain long-term competitiveness, decision-makers have to constantly engage in four interrelated activities of macro-environmental analysis (Ginter & Jack Duncan, 1990, p. 92):

1. Scanning macro-environments for warning signs
2. Monitoring environments for specific trends and patterns
3. Forecasting future directions of environmental changes
4. Assessing current and future trends

In highly complex and dynamic environments, the analysis and assessment of environmental changes and future trends constitutes a particularly difficult endeavor. As for such uncertain situations, a strand of strategy research has investigated the use of scenario planning as a tool for strategy analysis (e.g., Buytendijk et al., 2010; Evans, 2011; O'Brien & Meadows, 2013; Postma & Liebl, 2005). Scenario planning can be employed as an extension to traditional macro-environmental analysis, in which the researcher creates "several possible environmental and organizational change scenarios in order to assess strategic options and capabilities" (Evans, 2011, p. 461).
In addition to the PESTEL framework, Porter's (1979) *Five Forces* model outlines factors that affect the performance of firms on a *micro* level. Porter postulates that the *micro environment* is comprised of five forces (threat of new entrants, bargaining power of buyers, bargaining power of suppliers, threat of substitute products, and rivalry among existing competitors) that determine the attractiveness of a particular industry and, thus, the profitability of industry players (Michael E Porter, 1979, pp. 128-142).
A number of business model scholars, have adopted this strategy perspective as they conceived approaches to analyze the impact of environmental factors and conditions on a firm's business model (e.g., Osterwalder & Pigneur, 2010; Bernd W. Wirtz, 2011;

zu Knyphausen-Aufseß & Zollenkop, 2011). While drawing on factors very similar to those used for traditional strategy analysis, the authors present conceptualizations of the *business model environment* that aim to support managers in improving their current business model or in deriving ideas for new business models from identified influence factors. Schallmo (2013) consolidates existent conceptualization of the business model environment into a comprehensive analysis framework (see Figure 4). Analogous to the strategy perspective, the business model scholar makes a distinction between the macro- and micro-environment, drawing on the PESTEL and Five Forces frameworks to determine key environmental factors that fuel changes in the business models of market actors. Schallmo's approach further emphasizes the interdependencies between the different environments and a firm's business model. He notes that the macro-environment directly influences the configuration the five forces of a specific industry (i.e., the micro-environment), which, in turn, shape the design of the firms' business models (Schallmo, 2013, p. 36).

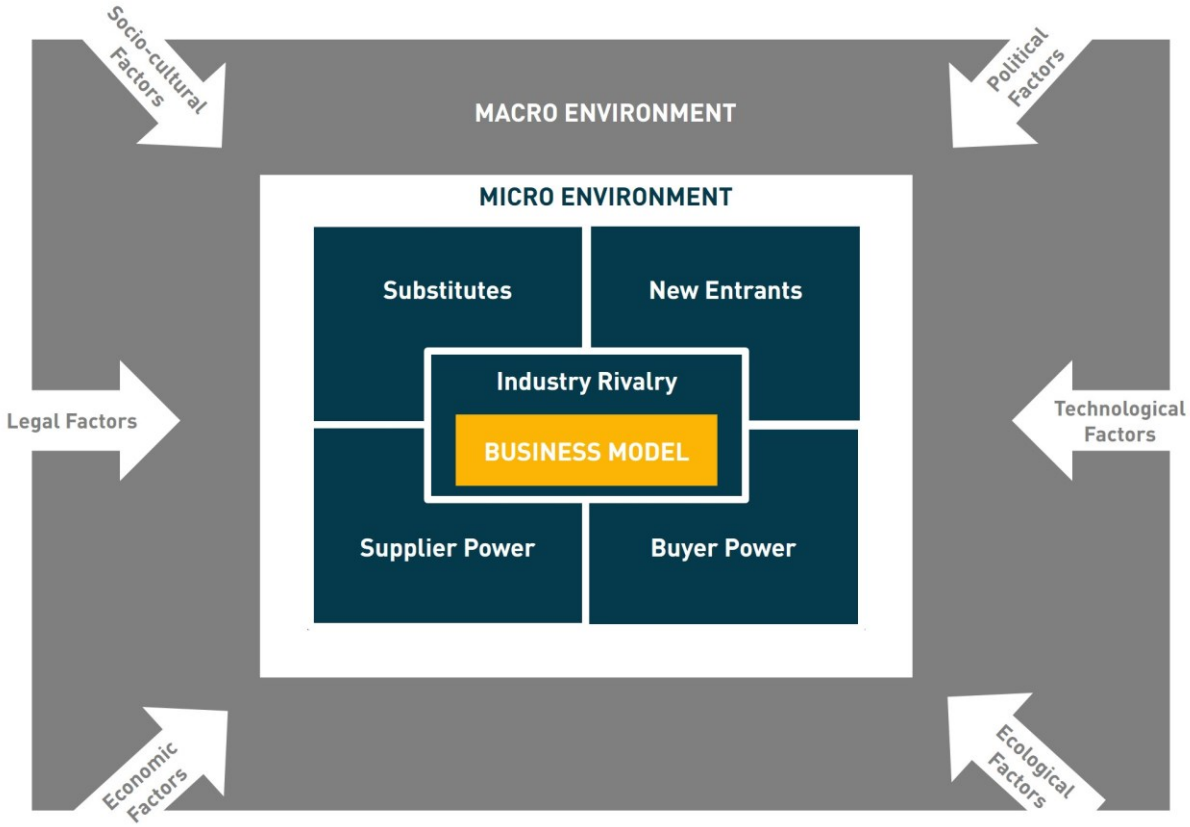

Figure 4: The Business Model Environment (based on Schallmo, 2013, p. 37)

In addition to that, Schallmo suggests to analyze the business model environment from two distinct perspectives: On the one hand, managers should look at the environment from the point of view of the company in order to assess the attractiveness of the current business model, define the position within the industry value chain, and determine valuable cooperation partners (Schallmo, 2013, p. 37). Besides it is crucial for firms to also maintain a customer perspective, which allows decision-makers to

spot opportunities, comprehend evolving customer needs and deduce a suitable value proposition from those. (Schallmo, 2013, p. 37).
While comprehensive and consistent, Schallmo's approach to analyzing the business model environment is very closely oriented towards traditional strategy concepts that originated in the 1980's – a time before the business model concept became an academically accepted and scientifically examined concept. Consequently, existing business model environment frameworks take insufficient account of the peculiarities and dynamics inherent in business models as they are conceptualized in today's research. Integrating a variety of managerial concepts and theories such as ecosystems, sustainability, multi-sided markets, industry convergences and individual perception of value Kamprath et al. (2014) have developed the Business Model Environment Template (B-MET) as a contemporary environmental analysis tool based on the Business Model Canvas (Osterwalder & Pigneur, 2010). The B-MET is designed to help managers develop, analyze and judge the consistency between business model and its environment by guiding the interpretation of characteristics and dynamics of a particular environmental context (Kamprath et al., 2014). In this thesis, the B-MET is used for the systematic scanning of external influence factors, scenario building and interpretation of data. The next section, describes the B-MET in more detail.

2.2.2 The Business Model Environment Template

The Business Model Environment Template (B-MET) (cf. Kamprath & Van den Broek, 2015; Kamprath et al., 2014) is a theory-driven but practical analysis tool. The template stays abreast of the emergence of new directions in management literature and transfers different theoretical concepts into an integrated practical context. These concepts include for example:

- Business ecosystems
- Sustainability
- Multi-sided markets
- Industry convergences
- Social construction of markets
- Value co-creation
- Technology regimes and transitions

Ensuing from Osterwalder's definition of business models as "a rationale of how an organization creates, delivers, and captures value" (Osterwalder & Pigneur, 2010, p. 14), the B-MET divides a firm's business model into 3 broad dimensions: *Value Proposition*, *Value Creation*, and *Value Capturing*. It further correlates each of the business model dimensions with a central area in the environment of the business model. In a given business model environment, a firms *Value Creation* mechanism is assumed to be most directly influenced by the environmental area of *Creating Ecosystem and Value Chain,* whereas the effectiveness of a firm's *Value Proposition* is highly contingent upon the consumers' *Perception of Value*. Moreover, the *Market Attractiveness* within an industry is deemed to have the largest impact on how firms organize their *Value Capturing* modes.
Kamprath et al. (2014) further outline 4 sub-dimension for each environmental area that provide a framework (see Figure 5) for the scanning of the business model

environment and the identification of key influencing factors. The scholars also formulate guiding questions that support managers in assessing the consistency between their firm's business model and its environmental context as well as in generating ideas for changing the business model so that it captures emerging opportunities and mitigates environmental threats.

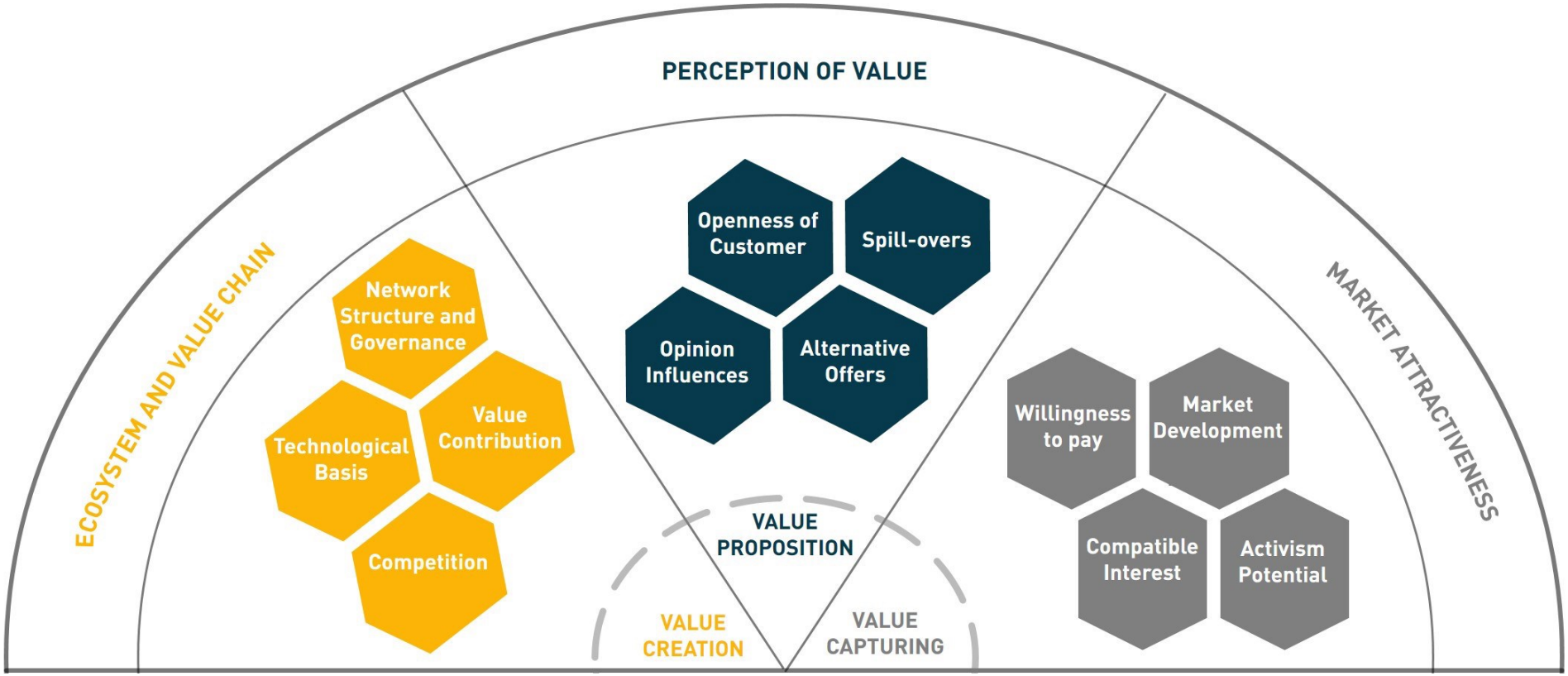

Figure 5: The Business Model Environment Template (based on Kamprath & van den Broek, 2015)

2.3 A Conceptual Framework for Business Model Innovation in Emerging Business Environments

Concerning the use of theory in qualitative research, Creswell (2014, p. 69) states that a social science theory can be placed at the beginning of a thesis, for example in the form of an overarching conceptual framework, to guide the research questions and clarify what the researcher seeks to find in a study. Saunders et al. (2009, p. 490) further mention that it may be advantageous to commence the research from a theoretical perspective, even when following an inductive research approach, because "it will link your research into the existing body of knowledge in your subject area, help you to get started and provide you with an initial analytical framework". The analytical framework brought forward in this thesis is rather of descriptive than theoretical nature, for it provides a conceptual overview while not laying claim to comprise explanatory power. The framework will be referred to frequently throughout the thesis, particularly during data analysis and at the end of the study when reviewing and discussing how the framework informed the findings and comparing the results to other studies.

The theoretical lens that configures the researcher's emphasis and shapes the conceptual framework is the *strategic entrepreneurship perspective*. This perspective integrates a firm's advantage-seeking (strategic) and opportunity-seeking (entrepreneurial) behaviors (Hitt et al., 2001, p. 481) and, thus, facilitates the simultaneous consideration of firms' internal situations and environmental circumstances (Schneider & Spieth, 2013, p. 19). Entrepreneurial and strategic actions aim at creating entirely new ways of doing business, which includes the exploration of new markets as well as the development of new business models that disrupt existing industries (Ireland et al., 2001, p. 53). This holistic and dynamic point of view is particularly applicable in uncertain and complex situations, in which firms are forced to respond to environmental changes by redesigning the way they create, deliver, and capture value (Amit & Zott, 2010, p. 15).

The theoretical concepts and ideas introduced in sections 2.1 and 2.2 are integrated to form an analytical framework that conceptualizes business model innovation in emerging business environments (see Figure 6). The conceptual framework presented here provides a starting point for the examination of questions regarding when, how, and how much managers should innovate their business models in a given environmental context. It illustrates how management's decisions concerning the epicenter (industry, enterprise, revenue model) and the process (evolution, adaptation, innovation) of business model change can be affected by the environmental context, specifically by environmental drivers (e.g., relating to perception of value, market attractiveness, and ecosystem and value chain) and by environmental conditions (e.g., uncertainty, dynamism, munificence). The framework also suggests that, in emerging business environments, managers have to proactively engage in business model innovation and initiate the change process early in order to develop business model options that are consistent with different projected states of the future business environment.

This understanding arises from a contingency theory perspective, which purports that organizational responses (e.g., strategy) should be consistent with environmental conditions (cf. Nenkat Venkatraman & Prescott, 1990; Zahra & Bogner, 2000). Despite being well established in strategy and organizational literature (cf. Natarajan

Venkatraman & Camillus, 1984) the notion of "external fit" has only recently gained momentum in business model research as business model literature increasingly investigates how environmental drivers (e.g., relating to perception of value, market attractiveness, and ecosystem and value chain) and environmental conditions (e.g., uncertainty, dynamism, munificence) interact with business model design choices (e.g., De Reuver et al., 2009; Heij et al., 2014; Kamprath & Glukhovskiy, 2014; Saebi, 2014; Bernd W Wirtz et al., 2010).

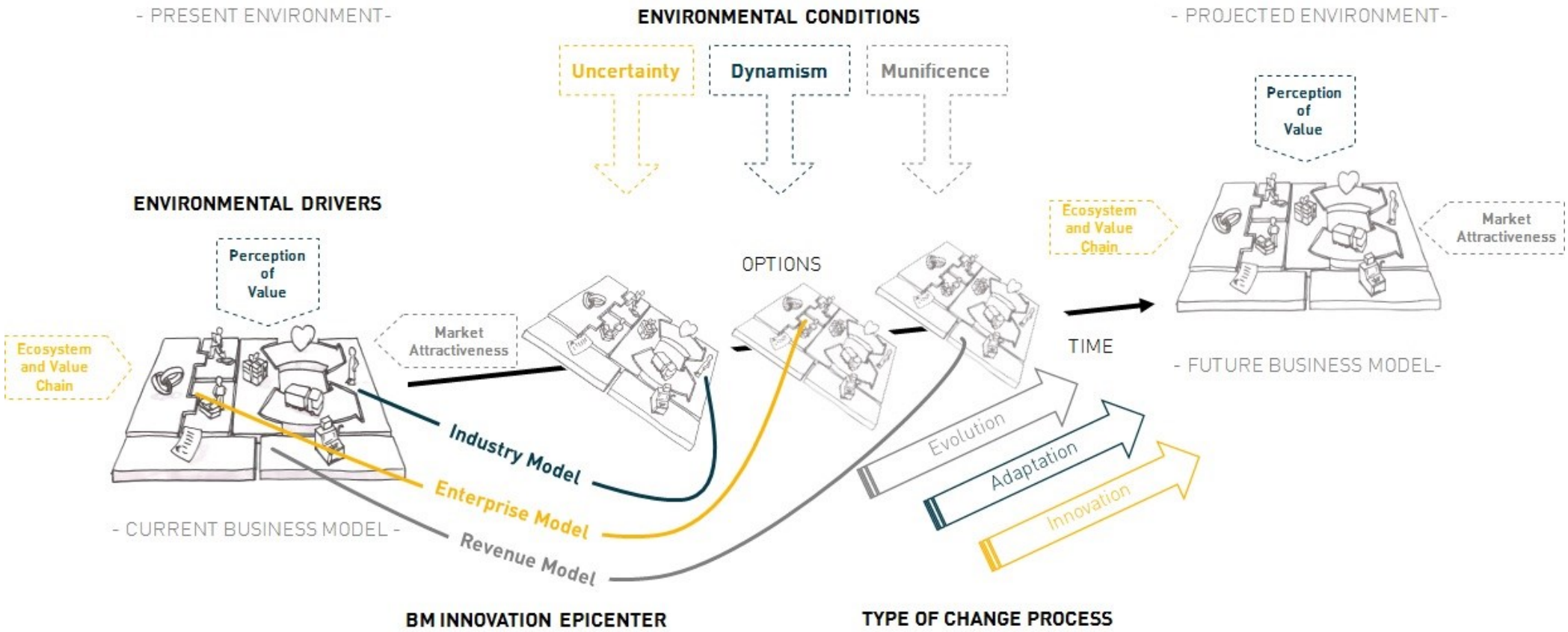

Figure 6: Conceptual Framework for Business Model Innovation in Emerging Business Environments

2.4 The Cognitive Perspective on Business Models and Environments

2.4.1 Business Models as Cognitive Structures

In addition to the rational positioning and evolutionary views discussed in the previous sections, several researchers have argued that "business models stand as cognitive structures providing a theory of how to set boundaries to the firm, of how to create value, and how to organize its internal structure and governance" (Doz & Kosonen, 2010, p. 371). In line with this cognitive perspective, the analysis of business models can be approached from either an objective or a subjective angle: Objectively, a business model describes how a firm structures its operational relationships with external stakeholders (e.g., customers, suppliers) and internal units (e.g., departments, employees). These objective relationships are tangibly reflected in a company's written contracts and organizing routines. Concomitantly, a business model is also an intangible manifestation of management's subjective beliefs regarding how the firm relates to its environment (ib.). On that note, Tikkanen et al. (2005, p. 789) conceptualize business models as the "sum of material, objectively existing structures and processes as well as intangible, cognitive meaning structures at the level of a business organization". Accordingly, business models can be understood as "cognitively manipulable" instruments (Baden-Fuller & Mangematin, 2013, p. 418) that incorporate a decision-maker's "unique view of reality" (Martins et al., 2015, p. 102).
In the process of venture creation, entrepreneurs use business models as cognitive systems through which they assimilate tacit knowledge from the business environment and translate these inputs into organizational goals and actions. In this sense, managers "develop implicit or explicit business models to make sense of and articulate the strategies they will use to take advantage of business opportunities they perceive" (Vargas & McCarthy, 2010, p. 1). In sum, the role of managerial cognition in business model development can be conceptualized as the origin of "systemic meaning structures or the belief system of a company" (Tikkanen et al., 2005, p. 789). These cognitive aspects of a business model strongly shape the decision-making of managers regarding material business model aspects (actions) and consequently affect business-related outcomes. Manifestations of strategic cognitions can occur in various different forms but the cognitive school generally agrees that managerial cognitions originate from mental structures that reflect ways a manager organizes knowledge (e.g., dominant logic, maps, schemas, frames) (Mintzberg et al., 1984, pp. 159-161). In this thesis, the researcher builds on the notion of schemas to portray the managers' interpretations and beliefs concerning business model innovation. Schemas can be described as mental systems that "represent beliefs, theories and propositions that have developed over time based on the manager's personal experiences [...] while operating within certain firms and industries" (Prahalad & Bettis, 1986, p. 489). Based on this understanding, this thesis examines the *business model innovation schemas* of entrepreneurs in early-stage wearable technology ventures.

2.4.2 Environmental Frames

Business model schemas can be considered "vehicles for enactment of environments" (Martins et al., 2015, p. 105), encompassing management's "understanding of causal links between the company and external settings" (Kringelum, 2015, p. 2). Along these lines, the nature of business model changes in response to objective environmental change is affected by the mental models, or frames, used by organizational members to subjectively interpret the tasks environment. As they scan the business environment for business opportunities, each entrepreneurs draws on her individual cognitive foundation which comprises, among other aspects, assumptions about the future, knowledge about alternatives and a view of the consequences of pursuing each alternative (S. Kaplan & Tripsas, 2008, p. 794). However, the high complexity and uncertainty of certain business environments often manifest the limits of human rationality (Schwenk, 1984). Du to this "bounded rationality" (cf. Cyert & March, 1963; March & Simon, 1958), decision-makers cannot apprehend and react to all environmental cues. As a result, they resort to mental models, or frames, to develop simplified and partial representations of the business environment (e.g., S. Kaplan & Tripsas, 2008; Porac et al., 1989). These subjective cognitive frames serve as a mental lens through which the entrepreneur filters knowledge, sets priorities and makes decisions (Nadkarni & Barr, 2008; Smith & Tushman, 2005). For this thesis, the researcher adopts Kaplan and Tripsa's (2005, p. 794) definition of frame, which they refer to as a "lens through which actors reduce the complexity of the environment in order to be able to focus on particular features, make context-specific interpretations, decide, and act". The concept of *environmental frames* used in this thesis, thus, describes the entirety of a managers' perceptions, assumptions, beliefs and interpretations regarding the business environment her firm operates in. As addressed from different angles in strategy literature, environmental frames may include the following non-exclusive list of aspects:

- beliefs about the identity of the firm, its competitors, suppliers and customers (e.g., Porac et al., 1989),
- beliefs about what it takes to compete successfully in a given industry (e.g., Porac et al., 1989),
- causal logics regarding the relationship between the external environment and firm strategy (e.g., Nadkarni & Barr, 2008)
- industry recipes: common norms developed by competitive groups about how firm's operate (e.g., which set of rival to attend to) (e.g., S. Kaplan & Tripsas, 2008),
- interpretations of general environmental characteristics such as dynamism, uncertainty, or velocity (e.g., Barr, 1998),
- Interpretations of specific events or changes in the environment (e.g., regulatory, consumer-related, technological) (e.g., Barr, 1998),
- attention focus: the degree to which top managers' subjective representations of their external environment are dominated by concepts related to one (or more) domain over others (e.g., external environment vs. internal organizational context or general environment vs. task environment) (e.g., Nadkarni & Barr, 2008).

3 LITERATURE REVIEW

3.1 Environmental Factors and Business Model Innovation

To answer the question of when to innovate the existing business model, managers can focus on environmental factors that drive the need for change in the business models of their specific firm. Giesen et al. (2009, p. 3) ascertain accordingly that "successful timing of business model innovation depends on the economic environment, the specific market and industry conditions, and a set of internal factors impacting the organization". A large portion of studies in the field of business model innovation detail general contexts in which environmental developments or circumstances engender a particular type of business model change (e.g. evolution, renewal, innovation). Voelpel† et al. (2004, p. 264), for instance, contend that "major and unpredictable changes" (deregulation, privatization, technological change, globalization, and changing competitive relationships), "the increasing importance placed on innovation and knowledge as value-creating attributes", and an "accelerating pace" have created an uncertain and global business environment in which "business model reinvention" constitutes a crucial element of long-term commercial success. Similarly, other authors point to "strategic discontinuities and disruptions, convergence and intense global competition" as impetus for "business model renewal" (Doz & Kosonen, 2010, p. 370) or stress the importance of "business model learning" (Teece, 2010) or "business model erosion" (McGrath, 2010) given the emergence of new business models in the market. Further, Johnson et al. (2008, pp. 64-65) name five strategic circumstances that encourage or necessitate business model innovation in general:

- The opportunity to address through disruptive innovation the needs of large groups of potential customers who are shut out of a market entirely because existing solutions are too expensive or complicated for them
- The opportunity to capitalize on a brand new technology by wrapping a new business model around it, or the opportunity to leverage a tested technology by bringing it to a whole new market
- The opportunity to bring a 'job-to-be-done' focus where one does not yet exist
- The need to fend off low-end disrupters
- The need to respond to a shifting basis of competition

Moreover, several studies explore environmental factors that have caused business model change in specific industries. Sabatier et al. (2012) have studied the changing landscape of the drug industry and identified "transformations in healthcare philosophies, new patterns of collaboration, and the collapse of the previous patterns of orchestration and integration" as the main triggers that change the dominant logic of the industry. Also, Vlachos et al. (2006, p. 155) find that "online music ventures are continuously reshaping their value propositions due to competitive reasons, rights management issues and evolving demands of the online music consumer".
A complementary stream of research has studied the influence of particular environmental factors on firms' propensity to innovate their business models. On that note, research has shown that, in general, different environmental factors (technology, market, regulation) are important during different stages in the service life of disruptive technologies (cf. Kijl et al., 2005). Kijl et al. (2005, p. 10) hypothesize that, in the early

"Technology/R&D" phase of an NTBV, business model decisions are mostly driven by technological issues. While market factors become crucial during the "Implementation/Roll-out" and "Market" phases, regulatory and legal issues are expected to have the biggest impact during the "Implementation/Roll-out" phase but to also play a role during the later stages. A cross-industry study by De Reuver et al. (2009) indicates that technology and market drivers influence business dynamics the most, while regulation has a minor impact. The authors also empirically confirm that technological drivers are more important in the "Development/R&D" phase than in later phases and find that market-related drivers have the biggest impact during the early stages of small start-ups (De Reuver et al., 2009, pp. 6-9).

Most of the literature that discusses the relationship between business models and the environmental drivers either describes the environment in highly abstract terms or lacks a systematic analysis of how external factors impact the type and nature of business model change. The empirical research by Kamprath & Glukhovskiy (2014) presents a more systematic ex-post examination and description of the interaction of industry upheaval and changes in specific business model components of a company in the gaming industry. The authors illustrate how industry change (operationalized by the transformation of the industry value chain) affects the configuration of business models and explain how the uncertainty and dynamism of a changing business environment can be addressed by *business model stretching*, i.e. a discovery-driven approach to business model innovation, involving temporary expansion and experimentation with new business model mechanisms (Kamprath & Glukhovskiy, 2014).

3.2 Environmental Conditions and Business Model Innovation

Although the majority of business model scholars share the view that business model innovation and adaptation is conducive to success (e.g., McGrath, 2010; Teece, 2010), the effectiveness of business model change is assumed to be moderated by the environmental context (Saebi, 2014, p. 147). Therefore, the question of how (much) to innovate, i.e. which type of business model change (e.g., renewal, adaptation, replication) to implement, depends to a great extent on the conditions in a given business environment (Heij et al., 2014). In the strategic management realm, the different ways in which environmental conditions impact strategic and organizational issues such as the effectiveness of strategic orientations (cf. Jabnoun et al., 2003; Şener, 2012), innovation strategies (cf. García-Zamora et al., 2013; Jansen et al., 2006), or organizational transformation (cf. Lengnick-Hall & Beck, 2005) have been investigated.

At large, relevant sector characteristics (e.g., maturity, capital intensity, technological opportunity) and environmental attributes (e.g., complexity, dynamism, munificence, competitiveness) are expected to affect the nature of strategies and business models change mainly through their impact on the uncertainty dimension of business environments. The ability to manage environmental uncertainty presents a critical success factor for young entrepreneurial firms, as it has a great bearing on "not only the availability of resources to the firm and the value of its competencies and capabilities, but also customer needs and requirements, as well as the competition" (Jabnoun et al., 2003, p. 19). As far as sector characteristics are concerned, the maturity of the industry is mentioned as a prominent source of uncertainty and ambiguity (cf. M.

H. Morris et al., 1999). Particularly in emerging and growth markets, the uncertainty regarding the emergence of a dominant design (Abernathy & Utterback, 1978), as well as the simultaneous rise of competing strategic approaches complicates the timing of commercial takeoff and the identification of viable business models. In such ambiguous and uncertain environments, managers of entrepreneurial ventures may perceive a greater need for business model adaptation (Andries & Debackere, 2004, pp. 14-16). Empirical research regarding environmental contingencies has mainly attempted to substantiate the moderating effect of environmental conditions on the relationship between business model innovation and firm performance. Zott & Amit (2007) take a rather static perspective on this questions as the authors analyze the degree of resource munificence, i.e. the "the extent to which the environment supports growth" (Zott & Amit, 2007, p. 9) influences the effectiveness of different business model design choices. The study results, however, did not provide evidence that the performance prospects of ventures with novelty- and/or efficiency-centered business model designs is contingent upon the availability costs of resources in a given business environment (Zott & Amit, 2007, pp. 25-27).

A much better-established argument is that business model innovation is particularly important in highly dynamic environments (cf. McGrath, 2010; M. Morris et al., 2005; Voelpel et al., 2005). Heij et al. (2014) empirically investigated the contingency effects of environmental dynamism, i.e. the frequency and intensity of changes in a firm's external environment (cf. Dess & Beard, 1984), on the relationship of different types of business model innovation and firm performance. The scholars distinguish between business model replication and business model renewal. While Business model replication refers to the "leveraging of an existing business model", Heij et al. (2014, p. 1503) understand business model renewal as "the introduction of a new business model that is beyond the framework of the previous one". Findings of the large-scale survey research suggest that business model replication is less effective in more dynamic business environments, i.e. environmental dynamism negatively moderates the relationship between business model replication and firm performance. However, no empirical evidence was found for the influence of environmental dynamism on the performance effect of business model renewal (Heij et al., 2014, p. 1506). By putting forward a contingency framework, Saebi (2014) takes a systematic approach to explain inter-firm performance heterogeneity regarding the implementation of business model change. Her contingency framework consolidates present propositions on the relationship between different types or degrees of environmental dynamism and business model dynamics (see Table 2). Based on the frequency, amplitude, predictability, and velocity of change, the author discerns three types of environmental dynamics (regular change, environmental shift, and environmental competitiveness) and hypothesizes that those need to be matched with appropriate organizational responses in terms of the type of business model change (evolution, adaptation, or innovation). Saebi (2014, pp. 153-154) reasons that in "fairly stable environments" with "low intensity gradual changes", high predictability and low amplitude of change – i.e. in conditions of *regular environmental change* – firms should engage in *business model evolution*, which involves simple, incremental adjustments and iterative fine-tuning of their existing business model.

	Environmental Dynamics		
	Regular Change	**Environmental Competitiveness**	**Environmental Shift**
Type of Business Model Change	Business Model Evolution	Business Model Adaptation	Business Model Innovation

Table 2: Contingencies between environmental dynamics and business model change (based on Saebi, 2014)

In highly dynamic environments, however, refining or "replicating" (Heij et al., 2014) a business model that has proven feasible under current conditions puts firms in danger of expending resources on improving capabilities that lose efficacy in the light of dramatic environmental upheaval. The resulting misfit between the refined business model and the rapidly changing environment can drastically decrease a firm's performance (Hamel & Valikangas, 2003). What is more, dramatic, discontinuous, infrequent and highly unpredictable changes to a firm's environment can have a "competence destroying" impact (Tushman & Anderson, 1986), making products and services obsolete (Jansen et al., 2006). Such *environmental shifts* (Saebi, 2014) may force firms to fundamentally revise their business models (M. Morris et al., 2005) or coerce firms into replacing an existing business model (McGrath, 2010) in order to capitalize on emerging opportunities such as new markets, consumer demands, or technological advances and respond to threats to the existing business model. Therefore, Saebi (2014) emphasizes the importance of revolutionary change in the form of *business model innovation* in view of environmental shifts. In the author's understanding, business model innovation involves a great extent of change to multiple dimensions of the business model simultaneously, which may yield completely new ways of creating, delivering and capturing value (Saebi, 2014, p. 150). In addition to the two extremes of regular change and environmental shift, Saebi discerns a third broad type of environmental dynamism, which she terms *environmental competitiveness*. Conditions of environmental competitiveness are characterized by "high velocity" "intense competition" and severe "pressures for higher efficiency and lower prices" (Saebi, 2014, p. 154). In such hypercompetitive environments, firms' resources and ability to invest in innovations are limited and their innovative performance is diluted by the large number of competitors (Zahra & Bogner, 2000). In such conditions of perpetual flux, managers need to focus on defending and evolving their basis for competitive advantage and, thus, renewing and innovating an existing business model might create inefficiencies due to conflicting goals (Saebi, 2014, p. 154). Consequently, Saebi advocates *business model adaptation* in highly competitive and periodically changing business environments. In contrast to business model innovation, the goal of business model adaptation is not to shape markets or disrupt industries by means of business model changes (Voelpel† et al., 2004) but rather to attain alignment with the environment through a process of continuous improvement of core and non-core dimensions of the firm's business model (Saebi, 2014, p. 150).

3.3 Managerial Cognition and Business Model Innovation

As shown in the preceding discussion of antecedents for business model innovation, a large part of the current literature in that area offers explanations for business model change that are predicated on rational positioning and evolutionary learning perspectives of strategic change (cf. Rajagopalan & Spreitzer, 1997). According to the rational positioning school (e.g., Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Teece, 2010), business model innovation is engendered by "highly rational decision makers who survey the environment to identify best positions" (Martins et al., 2015, p. 103) and design and adapt business models so as they are optimized for environmental conditions (see 3.2 Environmental Conditions and Business Model Innovation) and account for exogenous shocks (see 3.1 Environmental Factors and Business Model Innovation). Proponents of the evolutionary learning view of business models (e.g., Chesbrough, 2010; McGrath, 2010; Sosna et al., 2010) emphasize the importance of business model experimentation and trial-and-error learning in the face of environmental uncertainty.

Seeing business model innovation through a cognitive lens, a few authors have conceptualized business models as cognitive structures (see 2.4.1 Business Models as Cognitive Structures) that reflect mental models, frames, or schemas, of the firms' strategists. This cognitive perspective suggests that "the owner-manager's cognition and sensemaking provide the most important inputs into the initial business model design" (Sosna et al., 2010, p. 387). In line with this reasoning, a stream of business model research has explored the interdependencies of changing managerial cognition and business model innovation. Kringelum (2015), for example, uses a case study of the Port Aalborg Authority in Denmark to illustrate how changing cognitive frames of decision-makers can be important antecedents of business model innovation. Similarly, Martins et al. (2015) theorize that business models can be innovated proactively by deliberately engaging in processes for schema change.

Furthermore, regarding business models as structured reflections of managerial schemas can add to the understanding of how cognition moderates the interrelatedness of business environments and business models. According to the cognitive paradigm of strategy research, organizations are modelled as interpretation systems (cf. Daft & Weick, 1984), in which strategic decision-making is primarily determined by management's beliefs about the environment. A number of empirical studies have illustrated this relationship between the business environment, managerial cognition and strategic behavior. Some strategy scholars have depicted managerial belief systems and mental models as being reflected in how firm leaders interpret or perceive specific areas and events of their operating environment. The argument that managerial interpretations of environmental characteristics such as the level of hostility (Cook, 1975), the magnitude of change (Khandwalla, 1976), or environmental uncertainty (Carl R Anderson & Paine, 1975) influences the nature of strategic actions undertaken by the firm (e.g., reactive, meditative, intensive or proactive) has been well supported (Barr, 1998). Moreover, interpretations of specific environmental events were found to have a significant impact on the type of strategic response to environmental alterations (e.g., Dutton & Jackson, 1987; Thomas et al., 1993). Specifically, interpretations of events in terms of "opportunity" tend to trigger offensive-type strategic action while "threat" interpretations are correlated with

defensive-type responses or no responses (Staw et al., 1981). On that note, other studies have ascertained a connection between executives' cognitive maps of competitive positioning, and responses to competitive conditions. Such maps can for example comprise management's general perceptions of competing organizations (Porac et al., 1989) or competitor categorizations (Reger & Palmer, 1996).

Another popular approach to operationalize managerial cognition is to analyze attentional orientations of senior-level decision-makers (CEOs, TMTs). Ocasio (1997, p. 1) generally asserts the argument that "firm behavior is the result of how firms channel and distribute the attention of their decision-makers". T. S. Cho & Hambrick (2006) further explore the transformation of industry attention patterns following an environmental shift (deregulation in the airline industry) and elucidate the interdependencies between external events, context-specific managerial cognition and strategy changes. Similarly, Nadkarni & Barr (2008) empirically prove that the structure of cognitive representations of managers influences the speed of response to environmental events. In their research, they examine managerial cognition in the form of a manager's attention focus (general environment vs. task environment) and their environment-strategy causal logics (proactive vs. deterministic).

Focusing on a specific environmental factor, S. Kaplan et al. (2003) suggest that a firm's recognition of biotechnology's importance was a predictor of how the firm adapted to the discontinuous revolution in biotechnology. In a similar vein, Eggers & Kaplan (2009) find that, in times of technological advances, the timing of incumbent entry into a new technological market is affected by the direction of CEO attention towards technology. Industry players that pay more attention towards the emerging technology tend to enter new markets faster, whereas CEOs that focus on existing technologies hesitate longer.

While the role of managerial cognition in the environment-strategy relationship has been investigated extensively in strategy research, the applicability of these findings to the context of business models is yet to be thoroughly examined. This thesis aims at adding to this area of strategic management research by generating empirical insights into the interdependencies between industry context, managerial cognition, and business model innovation.

4 METHODOLOGY

4.1 Research Approach and Design

The lack of established theoretical frameworks in the area of investigation warrants an exploratory study that leaves greater leeway to obtain unexpected information and to canvass different paths. This flexibility inherent in exploratory studies suggests that "the focus is initially broad and becomes progressively narrower as the research progresses" (Saunders et al., 2009, p. 140).
Robson (2002, p. 59) considers exploratory research to be an appropriate means to examine "what is happening; to seek new insights; to ask questions and to assess phenomena in a new light". Despite proposing a conceptual framework (see 2.3 A Conceptual Framework for Business Model Innovation in Emerging Business Environments) and partly drawing on deductive reasoning during data analysis (see 4.4.3 Data Analysis), this thesis features a primarily inductive form of theory-building. This approach aims at challenging and extending the current body of knowledge by generating propositions exploring the main research questions. Pursuant to this inductive research approach, theory follows data as the researcher focuses on "generating data and analyzing and reflecting upon what theoretical themes the data are suggesting" (Saunders et al., 2009, p. 127). Saunders et al. (2009) list the following features that are characteristic for research with induction emphasis:

- gaining an understanding of the meanings humans attach to events
- a close understanding of the research context
- the collection of qualitative data
- a more flexible structure to permit changes of research emphasis as the research progresses
- a realization that the researcher is part of the research process
- less concern with the need to generalize (Saunders et al., 2009, p. 127)

These core principals shaped the researcher's choices regarding the research design and strategy as well as data collection techniques and analysis procedures.
This thesis employs a cross-sectional, case study design to explore the topic of business model innovation in entrepreneurial ventures and the influence of environmental conditions and managerial cognition on the design of business models in emerging industries. The case study follows an embedded design, in which the wearable technology industry constitutes the single case. Within this case, the study looks at multiple different units of analysis, including the environmental context as well as the cognitive frames and the business model innovation schemas of managers of entrepreneurial ventures in the wearable space.
Yin (2014, p. 16) defines the case study as an "empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context may not be clearly evident". (Yin, 2003a, p. xi) indicates that case study research is appropriate when investigators hope to "(a) define research topics broadly and not narrowly, (b) cover contextual or complex multivariate conditions and not just isolated variables, and (c) rely on multiple and not singular sources of evidence".

Business model innovation is indeed a contemporary phenomenon that should not be analyzed in isolation from its real-life context because its possible manifestations and characteristics highly depend on a complex variety of contextual factors. To facilitate this multi-layered analysis, this research considers multiple sources of evidence (data triangulation). Besides, a case study method is appropriate for this research because it allows an in depth examination of questions of the type "How?" and "Why?". These questions are important in this thesis, for they are geared towards a profound exploration of the context and processes that underlie business model innovation in entrepreneurial ventures.
This thesis will use a single case study design. According to Yin (2014, p. 51), the single case study is an appropriate design, if the nature of the case is critical, unusual/extreme, common/representative, or revelatory. This thesis' rationale for a single case is that the wearable technology industry is *representative* of emerging industries in the early stage phase of the industry life cycle: The advent of wearable technology presents a typical case of "creative destruction" (cf. Schumpeter, 2013), in which new technologies act as science-based innovations that have the potential to create a new industry or transform an existing one" (Day & Schoemaker, 2000). The wearable segment is still in the "unconnected" (Utterback & Abernathy, 1975) stage of the technology life cycle that directly follows a technological discontinuity. Wearable technology still lacks a dominant design and established form factors. During the unconnected stage, the critical input for innovation is not state-of-the-art technology but new insights about customer needs and the majority of innovations are product-based (Utterback & Abernathy, 1975, p. 646). The current state of the wearable technology industry is very representative of emerging industries that transition from the "introduction" into the "growth" stage (cf. Carl R. Anderson & Zeithaml, 1984; Michael E. Porter, 2004) of their life cycles. As wearable technology has diffused from "innovators" to "early adopters" (cf.Moore, 2014), the industry experiences accelerated sales and the boundaries of the industry are progressively being established. While the industry value chain is still in a state of flux, market entries and mergers amass rapidly as both incumbents and startups try to bring themselves in the position to profit from the expected upturn. In consideration of the above-described characteristics, the wearable technology industry closely represents a prototypical early-stage industry, which allows the researcher to analyze and discuss business model innovation in emerging industries in relation to existing theoretical concepts.
Following a multi-method qualitative approach (Saunders et al., 2009, pp. 151-153), this thesis draws on different qualitative data collection and analysis techniques. The two-step research process combines the scenario method (see 4.3 Scenario Method) with semi-structured qualitative interviews (see 4.4 Qualitative Interviews).

4.2 Research Process

The two-step research process followed in this thesis is inspired by van der Heijden's pragmatic approach to scenario-based strategy development (Van der Heijden, 2005, pp. 53-62) and incorporates elements from a body of research that combines dynamic business model design and strategic foresight to develop business model alternatives based on future scenarios (e.g., Bouwman et al., 2005; Chanal & Caron-Fasan, 2007; Chesbrough et al., 2013; Grienitz et al., 2009; Pateli & Giaglis, 2005). Van der Heijden explains that strategy emanates from the juxtaposition of the organizational "self" (Van

der Heijden, 2005, p. 60) and its external environment. In its simplest form, the organizational "self" can be described as a "Business Idea", which comprises three essential components;

- The societal/customer value created by this organization (i.e. the societal scarcity addressed)
- The Distinctive Resources and Competencies, owned by the organization, which allow it to create and appropriate value
- The reinforcing feedback loop, which turns the idea into a self-sustaining engine for ongoing survival and growth (Van der Heijden, 2005, p. 60)

Van der Heijden argues that most aspects of the contextual environment lie beyond the influence of an organization but greatly determine the success or failure of a Business Idea. Therefore, the environmental context "needs to be watched, studied and understood in terms of its future impact" (Van der Heijden, 2005, p. 60). The scholar proposes scenarios as a tool to characterize the future business environment. In the process of strategy development, managers should work out their firm's Business Idea, develop a set of relevant scenarios, and then analyze both regarding their "degree of fit" with each other. In case of poor fit between Business Idea and scenario characterization of the business environment, strategic adjustments should be conceived and implemented (see Figure 7).

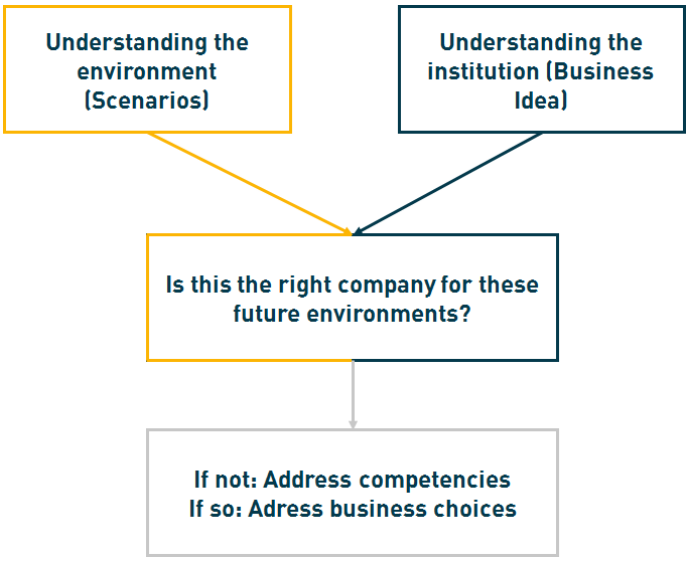

Figure 7: Fit between Environment and Business Idea (adopted from van der Heijden, 2005, p. 62)

During the first phase of this research, a scenario analysis was applied to the wearable technology industry in order to give a comprehensive overview of the context of the case study. The scenario analysis involved the exploration and listing of trends and driving forces as well as the identification and description of key driving forces. An exemplary future projection of the wearable technology industry was selected to be incorporated into the primary data collection. The scenario narrative served as the basis for vignettes used in the qualitative interviews.
In phase two, vignette-based semi-structured interviews were conducted with managers of young wearable technology firms. The interviews are designed to elucidate

the entrepreneurs' cognitive frames of the environment and their approaches to business model innovation. During the main part of the qualitative interview, the participants are asked to explain how they would react to the hypothetical environmental changes described in the vignettes in order to achieve better "fit" between their business models and the environmental conditions projected in the given scenario. In the process, the researcher responsively inquires about the participants' reasoning behind their decisions, explicitly laying the focus on which specific factors given in the vignette have influenced their decision regarding the alteration of a particular business model component. The textual material collected during the interviews is used to generate theoretical propositions concerning managers' cognitive approaches to business model innovation in emerging business environments.

Figure 8: Overview of the Research Process

4.3 Scenario Method

4.3.1 Scenario Development Approach

In this thesis, the researcher avails itself of the scenario analysis as a strategic foresight method. The discipline of strategic foresight is primarily concerned with the exploration and observation of trends and thus generates valuable information for all endeavors related to future studies, strategic management and innovation management in companies. With increasing degrees of dynamism and complexity, particularly in the external business environment, the success of market actors is closely linked to management's ability to timely recognize technological and societal upheaval and shifts in the market (Mietzner, 2009, p. 25). In its role to prepare and assist strategic decision-making, future studies deal with the anticipation of future developments and structural changes in the business environment and the examination of their root causes (e.g., technological, political, economic or socio-

cultural). The scenario analysis presents one the most widespread methods for future studies, for it has been employed by numerous government planners, corporate managers and military analysts to support decision-making in situations marked by great uncertainty (Mietzner & Reger, 2005, p. 220).
Despite the popularity of the scenario analysis among practitioners, there is still a large deal of confusion concerning core definitions in the scenario literature (Bishop et al., 2007, p. 6). Academics and practitioners do, however, agree on a few basic tenets of what defines a scenario. Thus, scenarios are viewed as systematic and plausible descriptions of "stories built around carefully constructed plots" of possible future situations, which can "express multiple perspectives on complex events" (Mietzner & Reger, 2005, p. 221). Each story is based on a complex network of projections of influence factors (Botthof et al., 2011, p. 219). This creates ''an internally consistent view of what the future might turn out to be" - not a forecast, but one possible future outcome (Michael E Porter, 1985, p. 446). Aside from these consensuses, the term scenario largely remains a "fuzzy concept" (Mietzner & Reger, 2005, p. 223) whose use and purpose is highly affected by the convictions and research foci of a given scholar. Particularly, the specific methodology of how to arrive at those consistent and plausible pictures of the future presents a critical point of disunity. Generally, two fundamental approaches to scenario development can be distinguished; the model-based approach (e.g., von Reibnitz or Gausemeier and Fink) and the intuitive approach (e.g., Schwartz or van der Heijden) (for an overview of scenario approaches see Mietzner, 2009, pp. 117-156).
This thesis draws on an understanding of scenarios that mainly emanates from Peter Schwartz's intuitive approach to scenario analysis. According to Schwartz (1991, p. 4), ''scenario analysis is a tool for ordering one's perception about alternative future environments in which one's decisions might be played". As opposed to the model-based, deductive approach his method does not rely on formalized tools or algorithms but follows a less structured, iterative, and creative process of scenario development (Mietzner, 2009, p. 140). With this approach, scenarios are developed inductively through the systematic interconnection of possible projections of critical influence factors. Also, the developed scenarios are "exploratory" in the sense that they start from a status quo in the present and explore various different prospective development paths from there. In terms of goal-directedness, the scenarios can be classified as "descriptive" because they are based on neutral cause-effect-relationships and thus do not incorporate goals or judgements of final users (cf. Mietzner, 2009, pp. 111-114).

4.3.2 Scenario Development Process and Methods

The scenario development process followed in this thesis (see Figure 8) orientates itself by Schwartz's eight-step approach to scenario-building. Schwartz's framework for scenario building merely specifies the outcome of each step. It is therefore, subject to the researchers' "common sense" and interpretation which methods she employs to achieve the desired results (Masini & Vasquez, 2000, p. 52). In line with the view that "a mix of methods and instruments seems to be most promising" for foresight studies (Cuhls, 2003, p. 98), the researcher combines qualitative methods such open coding, systematic categorization, integration, and abstraction with a quantitative influence analysis and system-grid.

Step 1: Desk research to explore focal issues and trends

In step 1, a large amount of qualitative documentary secondary data is collected to explore focal issues and key trends in the wearable technology industry. In a desk research, secondary data is retrieved from publicly available sources. The scenario, and hence the desk research, focus on the business environment that surrounds the global wearable technology industry. Thus, the data collection is not limited to specific geographic regions. Due to the linguistic background of the researcher, data sources were either in German or English language.
Owing to the practical relevance of the research topic, the search strategy is not restricted to academic publications. The desk research, therefore, encompassed the following secondary data sources:

- Scientific papers in peer-reviewed technology and innovation journals
- Books about technological and consumer-related trends
- Company websites of wearable technology firms
- Trend reports and market predictions for the wearable technology industry published by major research and consultancy firms
- Expert interviews and conference recordings (transcribed, video, and audio) available on online news sites and video platforms
- Articles on relevant technology blogs and news portals
- Presentation slides by consumer electronic experts, firms and research consultancies in the field of wearable technology
- Patent applications

Saunders et al. (2009, p. 268) stress that secondary data can help a research purpose because they may have fewer resource requirements (e.g., time and money) and are unobtrusive. As a result, researchers can benefit from existing knowledge and spend more time on data analysis and interpretation. On the other hand, when drawing on secondary data, the researcher is at risk that the data may have originally been collected for a purpose that does not exactly match your research questions and objectives. Moreover, the researcher does not have real control over the quality of secondary data, which may also be subject to publisher bias. Saunders et al. (2009, p. 272), consequently, advise the researcher to keep in mind "that the culture, predispositions and ideals of those who originally collected and collated the secondary data will have influenced the nature of these data at least to some extent".

Step 2: Coding and categorization to list industry trends and identify driving forces

For the scenario analysis, the notion of a driving force is understood as higher-level groups or combinations of several interrelated, multi-directional trends. Therefore, it is the goal of step 2 to subsume current trends in the wearable technology industry (e.g., *age of context*, *technology individuality*) to form more abstract driving forces (e.g., *technology usage patterns*). In order to extract meaning from the unstructured collection of trends gathered in step 1, an inductive data analysis approach was used with the purpose of deriving a concrete list of driving forces from the raw data. First, the raw data was coded with the *open coding* technique (cf. Corbin & Strauss, 1990, p.

12) to give trends conceptual labels or headings that summarize the core idea behind them. Second, a coding scheme was developed based on the *Business Model Environment Template* (see 2.2.2 The Business Model Environment Template). The coding scheme was used to systematically categorize trends according to the dimension of the business environment they relate to. Next, relationships between trends were mapped out and the data was rearranged hierarchically. This process of *axial coding* (cf. Corbin & Strauss, 1990, p. 13) aims to achieve a greater level of data abstraction and integration. The emerging trend categories were then further checked for redundancies and analyzed for common patterns, which resulted in a final list of driving forces (see Figure 9).

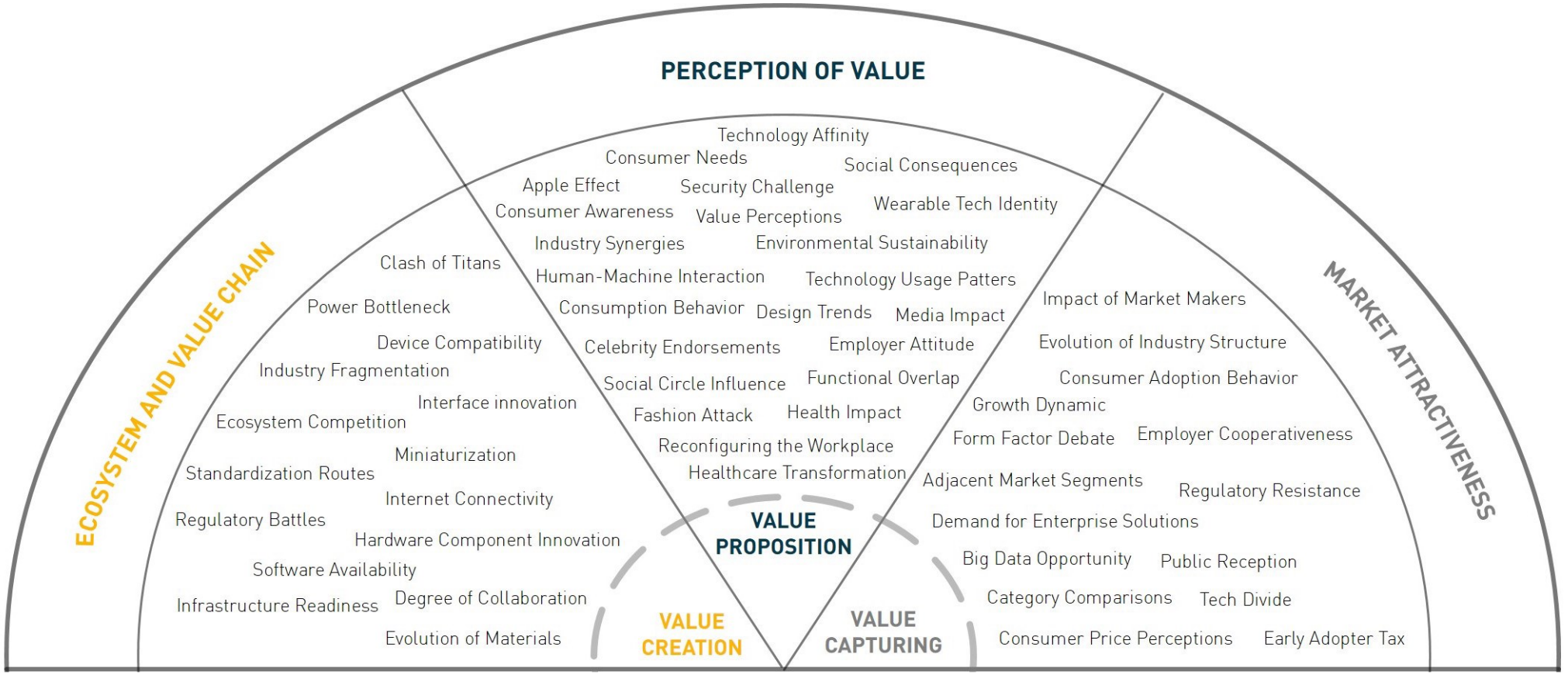

Figure 9: Driving Forces in the Wearable Technology Industry

Step 3: Influence analysis to determine key driving forces

In step 2, a total of 53 driving forces were identified. In step 3, a quantitative approach to influence analysis according to Ute von Reibnitz (1992) was used to reduce the extensive list of driving forces to a manageable number of key driving forces that have the biggest impact on the future of the wearable technology industry. The influence analysis was conducted with the help of the *MICMAC* software tool which is provided for free by the LIPSOR Institute (Laboratoire d'Investigation en Prospective Stratégie et Organisation) as part of their *La Prospective* strategy analysis suite.
In order to filter the most significant drivers from a complex net of interconnected factors, von Reibnitz (1992, pp. 33-45) suggests to compare all factors in a cross-impact matrix (see Figure 10). In a cross-impact matrix, the input forces are analyzed regarding their reciprocal impact. Based a rating scale from 0 (no impact) to 1 (weak or indirect impact) to 2 (strong impact) the matrix conveys a first impression of the interdependencies of driving forces within the influence system: The addition of row values yields the *active sum* which reflects the impact that a particular force has on all others. The *passive sum* results from the addition of column values and indicates how much a force is influence by all others.

	49 : HealthImRe	50 : SocCons	51 : HealthTran	52 : EnvSus	53 : IndSyn	54 : SecChall	Active Sum
49 : HealthImRe	0,00	0,00	1,00	1,00	0,00	1,00	**43,00**
50 : SocCons	0,00	0,00	0,00	0,00	0,00	0,00	**22,00**
51 : HealthTran	0,00	0,00	0,00	2,00	2,00	3,00	**65,00**
52 : EnvSus	1,00	2,00	1,00	0,00	3,00	2,00	**61,00**
53 : IndSyn	0,00	0,00	2,00	1,00	0,00	0,00	**21,00**
54 : SecChall	0,00	1,00	3,00	0,00	0,00	0,00	**67,00**
Passive Sum	**28,00**	**45,00**	**36,00**	**18,00**	**34,00**	**53,00**	

Figure 10: Cross-Impact Matrix (Excerpt)

The data from the cross-impact matrix are transferred into a *system grid* (see Figure **11**) in which - according to their positioning on the grid - the driving forces can be classified as one of four types of system elements:

- **Driving:** forces in the active area have strong influences on others, whereas the influences of others on these forces are weak.
- **Driven:** forces in the passive area are influenced strongly, whereas their influence on others is weak.
- **Ambivalent:** forces in the ambivalent area have strong influences on others and are influenced by others strongly as well.
- **Buffering:** forces in the buffering area are neither passive nor active.

Figure 11: System Grid

As for the analysis of system dynamics, von Reibnitz (1992, p. 39) proposes to tackle the elements of a system that bear the greatest amplification potential. Usually, this level of efficiency can be found in active or ambivalent forces. Following this reasoning, 26 driving forces were initially filtered out. Finally, another round of abstraction and integration (i.e. axial coding) was necessary to arrive at a workable list of 12 *key driving forces* (see Figure 12).

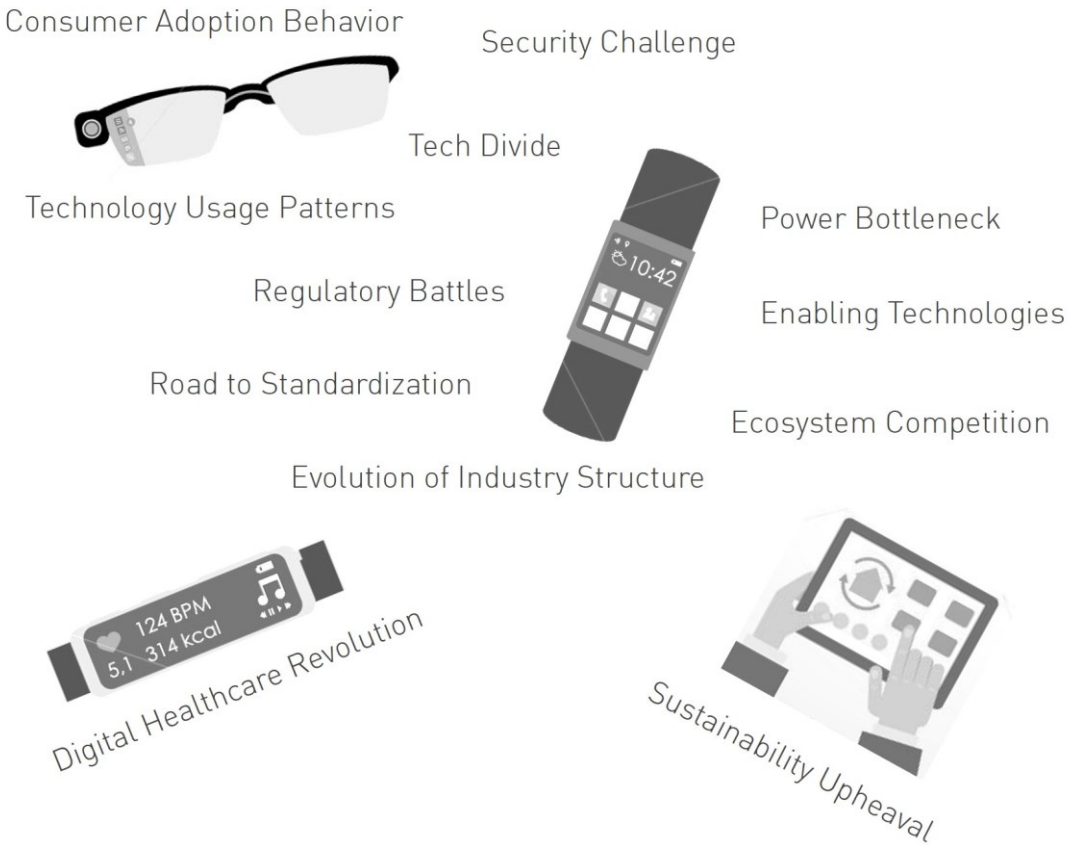

Figure 12: Overview of Key Driving Forces in the Wearable Technology Industry

Each key driving force was then described detail, using the assigned trends to derive key issues and critical questions for the respective influence area (see 5.1 Description of Key Driving Forces).

Step 4: Expert discussion and creative thinking techniques to ascertain the scenario logic and flesh out the scenarios

The descriptions of key driving forces from step 3 served as a basis for an ensuing expert discussion. In a first unstructured qualitative interview, the expert was asked to evaluate and or/confirm the selection of key driving forces and to add trends and examples. In the course of the discussion two recurring, overarching themes were worked out that encapsulate the interdependencies of all 12 key driving forces and hence encompass the most critical questions for the future of the wearable technology industry:

- **Human-Technology Nexus:** The development of the interplay between human behavior and technology; Related key driving forces: Consumer Adoption Behavior, Security Challenge, Tech Divide, Technology Usage Patterns, Power Bottleneck, Enabling Technologies)
- **Ecosystem Complexity:** The nature and degree of ecosystem interconnectedness and competitive actions; Related key driving forces: Evolution of Industry Structure, Road to Standardization, Regulatory Battles, Ecosystem Competition, Digital Healthcare Revolution, Sustainability Upheaval)

These two main themes constitute the scenario axes. The scenarios are then built around these axes in the form of consistent "stories", whereby the direction of the development of the Human-Technology Nexus (*interweavement vs. alienation*) and the Ecosystem Complexity (*liaison vs. seclusion*) determine the distinct dynamic of each scenario.
Due to the fact that the main purpose of the industry scenarios for this research is to support the primary data collection as part of the vignette exercise in the qualitative CEO interviews, the scenario building process was geared towards constructing a picture of the future that provokes the most reactions out of the interview partners. Therefore, the result of the process should be a scenario that significantly deviates from average expectations about future developments in the wearable space. In the course of the expert discussion, projections for two "extreme" scenarios were elaborated. The scenarios are considered extreme in the sense that they each combine either the least dynamic (alienation and seclusion) or the most dynamic (interweavement and liaison) manifestations of the main themes. To support idea generation and integration of driving forces and projections into the scenarios, creative thinking techniques such as checklists and brainstorming were employed. These type of divergent creativity techniques can strengthen the creative process by facilitating the connection of previously unconnected domains (Kilgour & Koslow, 2009, p. 299).
Based on these projections, the researcher subsequently wrote out vivid scenario narratives and gave each scenario an illustrative name. The most dynamic scenario was labeled "Vortex of Change" while the less dynamic scenario was named "Age of Stagnation". Afterwards the expert evaluated the scenarios concerning their suitability for the vignette exercise (for vignette design criteria see 4.4.2 Data Collection). Ensuing from the comparison of plausibility, consistency and appropriateness of context, the most dynamic scenario ("Vortex of Change") was selected to be incorporated into the data collection process.

4.4 Qualitative Interviews

4.4.1 Sampling and Acquisition of Interview Partners

Since the interview sessions involved conversations on strategy and business model issues the effectiveness of data collection depended on the participants' level of strategic and operational insight into the company. Moreover, according to the cognitive view on business models, a firm's business model design is strongly shaped by the owner-manager's cognition, i.e. his beliefs, perceptions and interpretations (Sosna et al., 2010, p. 387). Hence, it was important to conduct the interviews with high-level company representative, ideally founders, because they are the most knowledgeable persons regarding strategic orientation and operations and directly influence the latter through their vision and ideas. However, during the early stages of the venture life cycle founders of entrepreneurial ventures are typically occupied with many different and urgent tasks and responsibilities. Numerous founders had to decline the interview request because they were busy preparing the initial product launch or securing financing to get the company up and running and thus had difficulties to find a time slot in their full schedules.

Besides accessibility issues, the research objectives and research strategy informed the choice of sampling technique. As this thesis does not focus on generalizability but rather on the in-depth analysis of a few information-rich cases, a non-probabilistic purposive approach to sampling is adequate (Saunders et al., 2009, p. 239). In purposive sampling, the researcher relies on her judgement to select cases that are most suitable to answer the research questions. In contrast to probability sampling, purposive samples do not need to be statistically representative (ib.). In order to allow a close and profound investigation of managerial cognitions, the researcher aimed at selecting a homogeneous group of interviewees. While the interviewees manage firms in different market segments (e.g., Health and Fitness, Communication, Fashion), the researcher focused on meeting the following homogeneity requirements in terms firm type and company structure:

- All firms should target to some extent the consumer market of the wearable technology industry.
- All firms assume a value chain position in which they produce product solutions and therefore implement or plan on implementing some version of a technology hardware business model.
- All firms are still in the *birth* phase of the firm life cycle (see 1.5.3 Entrepreneurial Ventures) in which they face challenges typical of the period of "creative evolution" (Greiner, 1998) (e.g., resource scarcity, business model uncertainty, product launch pressure).

To identify and select the homogeneous group of interviewees, an extensive search for firms that meet the aforementioned criteria was conducted. Apart from typical online resources such as technology blogs and news sites, the researcher regularly searched crowdfunding platforms (e.g., Kickstarter, Seedmatch, Startnext) in order to spot early-stage wearable technology projects. In addition to that, the researcher visited technology fairs such as the Internationale Funkausstellung (IFA) 2014 and the CeBIT 2015 to make direct contact with relevant firms. The resulting list of firms was populated with names and contact details of high-level company managers (CEOs and/or founders). The interview prospects were then invited to an interactive interview session. In order to arouse the interest of at least a few entrepreneurs, marketing material was sent along with every interview invitation. The material advertised the interview session as a business model innovation exercise and emphasized the benefits for managers in terms of strategic insight, environmental foresight and proactive change process initiation. Furthermore, at the end of each interview the participants were asked to name managers with a similar profile as they have. This pyramiding approach (cf. von Hippel et al., 2009) was used to gain access to CEOs and founders within the interviewees' professional network. Even though the market for wearable technology in Germany is catching up gradually, the bulk of wearable technology firms are still located in the USA or spread across the world. From the interview sample, only one firm is based in Germany, one in Sweden, one in Australia, one in India, one in the UK, and one in the USA. The interview participants managed companies in different segments of the wearables industry, ranging from communication to fashion to health and fitness (see Table 3).

Interviewee	Company	Position	Wearables Segment	Country
IP 1	Company A	Founder / CEO	Fashion	Australia
IP 2	Company B	Managing Director	Fashion	UK
IP 3	Company C	Founder / CEO	Communication	Sweden
IP 4	Company D	Co-Founder	Health and Fitness	Germany
IP 5	Company E	Founder / CEO	Health and Fitness	USA
IP 6	Company F	Founder / CEO	Fitness and Navigation	India

Table 3: Overview of the Interview Sample

4.4.2 Data Collection

For the exploration of the main research questions, qualitative semi-structured interviews are conducted with founders and managers of entrepreneurial ventures in the wearable technology space. The goal of these vignette-based interviews is to gather valid and reliable data that are relevant to answering the main research questions. As stated above, the main research questions that shaped structure and content of the qualitative interviews are:

RQ 1: *How do managers of entrepreneurial ventures in the emerging wearable technology industry take into account the business environment when designing their firms' business models?*

RQ 2: *How do managers of entrepreneurial ventures approach business model innovation in the emerging wearable technology industry?*

Due to the ambiguity of environmental changes, decision-making processes in entrepreneurial ventures are all the more influenced by the nature of managerial cognitions. It follows that managers' perceptions and interpretations of the environment will combine with existing organizational routines in shaping firm responses such as business model innovation approaches (cf. Sosna et al., 2010, p. 386). Given this understanding, the researcher chose to conduct qualitative interviews with open-ended questions "intended to elicit views and opinions from the participants" (Creswell, 2014, p. 190). Qualitative interviews are generally considered a suitable data collection method for exploratory studies that focus on seeking new insights regarding the beliefs and meanings interviewees associate with the phenomena in question (Saunders et al., 2009, p. 315). For the semi-structured interviews a broad list of topics and questions to be covered was prepared in advance (see Appendix I) but the order and completeness varied from interview to interview. Depending on the specific organizational context and on the issues addressed by the interviewees, questions and topics were omitted or added. In addition to their flexibility, semi-structured interviews give the interviewer the opportunity to probe answers and have participants explain or elaborate on their responses. As a result, the researcher can expect to collect a rich

and detailed data set that may comprise novel themes that she had not previously thought of but that significantly enhance the understanding of a certain phenomenon (Saunders et al., 2009, pp. 315-316).
The main part of the qualitative interview consists of a vignette exercise in which the participants are asked to discuss the ramifications of concrete environmental events on their business models (see Appendix II for Scenario Vignettes). Vignettes can be described as "short stories about hypothetical characters in specified circumstances, to whose situation the interviewee is invited to respond" (Finch, 1987, p. 105). In the quantitative realm, the constructed and fictional nature of vignettes is often criticized because it does not allow to make inferences and predict people's behavioral response in real-life situations (Hughes, 1998). Since the goal of qualitative research is often not the prediction but rather the exploration of phenomena, this gap between vignettes and reality is not a concern to the qualitative researcher. To the contrary, the vignette technique corresponds well to the exploratory, cognitive perspective assumed in this thesis because it allows the researcher to elicit perceptions, opinions, beliefs and attitudes from the interviewees' responses and comments (Barter & Renold, 1999).
In the field of business research, it has been argued that vignette-based studies produce better results than direct-question-based studies because vignettes

- provide greater realism by offering a range of situational or contextual factors,
- supply standardized stimuli to all respondents, which enhances internal validity, measurement reliability, and ease of replication,
- improve construct validity by focusing respondent attention upon specific features of the research question,
- bypass difficulties (e.g., time, expense) of studying real business decisions,
- reduce yea-saying/social desirability bias, especially if behavioral intentions questions are phrased in the third rather than first person, and
- enhance respondent involvement and dramatize issues (Wason et al., 2002, p. 42).

However, for vignette-based research to provide these advantages it has to follow a number of design principles. Therefore, throughout the construction of the vignettes, the researcher has paid attention to the following design guidelines suggested by Barter & Renold (1999, pp. 3,4) :

- "The stories must appear plausible and real to participants."
- The vignettes should be "readily understood, internally consistent and not too complex."
- "The vignettes need to contain sufficient context for respondents to have an understanding about the situation being depicted, but be vague enough to 'force' participants to provide additional factors which influence their decisions."

In order to ensure the plausibility, consistency, and appropriateness of context, the scenarios developed in phase one of the research process (see 4.2 Research Process) have been discussed, finalized and assessed in consultation with one of the leading

wearable technology experts in Germany[1]. As a result of this external validation process, the most dynamic scenario "Vortex of Change" was selected to serve as the basis for the interview vignettes because the hypothetical stories in this scenario best fulfilled the outlined design criteria. During the qualitative interviews, all entrepreneurs are confronted with the same vignettes that reflect the environmental conditions projected in the "Vortex of Change" scenario. Thus, the vignettes offer a common frame of reference where interviewees are brought to the same level of information regarding the developments in this hypothetical business environment. This allows the researcher to more precisely single out the cognitive aspects of the entrepreneurs' narratives by controlling the nature and scope of environmental cues (standardized stimuli) the interviewees are subjected to.
In total, six interviews were conducted with CEOs and/or founders of entrepreneurial ventures in the wearable technology industry. Owing to the tight schedules as well as geographical distance and dispersion of the interview partners, all interviews were conducted via voice-over-IP calls. To increase trust, see the non-verbal behavior, the look and feel of a face-to-face conversation was emulated by using the video conferencing function of the skype software. Saunders et al. (2009, pp. 341-342) mention a number of disadvantages associated with using telephone or voice-over-IP for non-standardized interviews, particularly in exploratory research. Those include difficulties to establish a level of trust that facilitates fruitful exploratory discussions, problems in developing more complex questions, and other ethical issues. That being said, the advantages in terms of speed and lower cost and above all the opportunity to talk to appropriately knowledgeable and interesting interview partners outweighed the drawbacks of foregoing face-to-face conversations. The length of interviews ranged from 30 to 60 minutes. The interviews were audio-recorded and notes were taken during the interview. After each interview, the recordings were immediately transcribed.

4.4.3 Data Analysis

The analysis of the interview data is conducted following the procedures of qualitative content analysis (Mayring, 2002, pp. 114-120). Qualitative content is a method for systematic text analysis which was developed by Philipp Mayring in the course of a study on psycho-social consequences of unemployment (Ulich et al., 1985). The overall goal of qualitative content analysis is to systematically describe the meaning of materials in a certain respect that the researcher specified from research questions (J. Y. Cho & Lee, 2014, p. 5). Mayring's framework presents the first attempt to stipulate specific procedures required in qualitative content analysis. According to Mayring's understanding, qualitative content analysis is a replicable "approach of empirical, methodological controlled analysis of texts within their context of communication, following content analytical rules and step-by-step models " (Mayring, 2000, para. 5).
One unique characteristic of qualitative content analysis is that it allows for the flexible use of inductive or deductive reasoning or a combination of both approaches in data analysis. In this thesis, the interview data is analyzed in a two-step process of qualitative

[1] Florian Schumacher, the discussion partner is digital health consultant at Munich-based *iic-solutions*, founder of *Quantified-Self Germany*, and trendscout at *Wearable Technologies*. On his blog www.igrowdigital.com he writes about product releases in the wearable space as well as the impact of quantified-self technologies on society.

content analysis that integrates deductive and inductive analyses to accomplish different types of data structuring (i.e. summarizing and type-building)
During the first step of qualitative content analysis, the deductive approach is employed to perform content summarizing, also called thematic analysis, which aims to "filter out from the material specific content dimensions and to summarize this material for each content dimension" (Mayring, 2014, p. 104). In this deductive approach, categories and subcategories are grounded in the research question, directly derived from theory (step 1) and formulated (step 2) before being applied to the text material. A coding agenda (step 3) establishes explicit definitions, examples and coding rules for each deductive category and thereby ensures "a methodological controlled assignment" of the categories to fitting text passages (Mayring, 2000, para. 15). To better prepare the textual material for the use in the subsequent type-building content structuring, each assigned text passage was enriched with an open code that summarizes the main idea of the respective quote. The categories and coding guidelines are revised after 10-50% of the material (step 4). Subsequently, the research works through the rest of the material (step 5) and finally interprets the results (step 6). Figure 13 shows the step-by-step process of deductive category assignment.

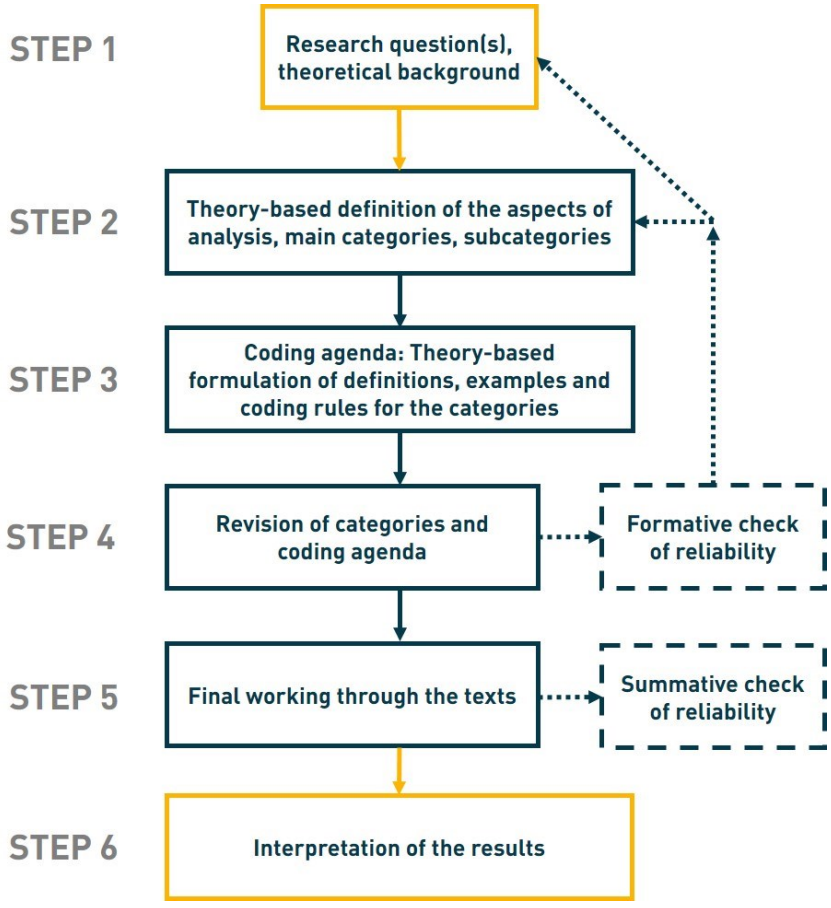

Figure 13: Steps of deductive category assignment (adopted from Mayring, 2000, para. 14)

In this thesis, the procedure for deductive category application was followed to structure the environmental frames and business model innovation schemas of the interviewed entrepreneurs (for coding agendas see Appendix III and IV).

The notion of *environmental frames* originates from previous research on the cognitive perspective of business models and business environments (see 2.4.2 Environmental Frames). Consequently, relevant interview passages were assigned to the following 4 main categories that subsume different aspects of managers' cognition of the business environment:

- **Attention Focus**: The area of the environment that managers emphasize the most and consider the most important when analyzing the effect of environmental conditions on their business models
- **Winning Recipe**: The key success factors and efforts that determine who will be successful in a respective industry
- **Scope of Analysis**: The variety and scope of environmental areas that managers consider when analyzing the effect of environmental conditions on their business models
- **Causal Logics:** The managers' general understanding of the way in which their business models are interlinked with the business environment

Furthermore, sub-categories of environmental frames were derived from the *Business Model Environment Template* (cf. Kamprath & Van den Broek, 2015) to assign the beliefs and interpretations of entrepreneurs to one of the following environmental influence areas:

- **General:** referring to environmental conditions (e.g., dynamism, uncertainty, complexity, munificence) or the environment as a whole
- **Perception of Value:** referring to events in the influence areas of Openness of Customer, Spill-Overs, Opinion Influences, and Alternative Offers
- **Ecosystem and Value Chain:** referring to events in the influence areas of Competition, Network Structure and Governance, Technological Basis, and Value Contribution
- **Market Attractiveness**: referring to events in the influence areas Market Development, Willingness to Pay, Activism Potential, and Compatible Interest

As for the business model innovation schemas, the initial coding agenda was based on existing categorizations of business model change types and dynamics (see 2.1.4 Business Model Dynamics and Innovation) as well as cognitive conceptualizations of the business model (see 2.4.1 Business Models as Cognitive Structures). After the revision of the coding agenda (step 4), the material was assigned to the following 4 main categories:

- **Role in the Firm:** The significance a manager ascribes to business model innovation in terms of how it relates to the broader strategic decision-making in the firm
- **Planned Outcome:** The goal a manager envisages when engaging in business model innovation in terms of how operations and strategy should change as a result
- **Scope:** The variety and scope of business model dimensions that a manager considers when engaging in business model innovation

- **Process:** The nature of all measures related to business model innovation in terms of frequency, timing and degree of novelty

Furthermore, by combining the 9 components of Osterwalder's (2010) Business Model Canvas and the 3 main ways of adapting business models suggested by Giesen et al. (2009), the categories "Revenue Model", "Industry Model", "Enterprise Model", and "General" were defined as sub-categories for the examination of "epicenters" (cf. Osterwalder & Pigneur, 2010, pp. 138-139) of business model innovation schemas.
The goal of the second part of qualitative content analysis was to classify the pre-structured material into different types of business model innovation approaches in the emerging wearable technology industry and to describe them. This form of "type-building content analysis" (cf. Mayring, 2014, pp. 105-106) is related to inductive category development. Inductive category development follows a similar process as deductive category application but both approaches differ from each other in the way coding criteria are initially formulated and categories are built (step 2 and 3). The inductive analysis is not based on predetermined categories and concrete coding rules but starts from a broad category definition (Step 3) that determines the selection criteria (which aspects of the material are deemed relevant) and the level of abstraction. Categories are then deduced tentatively from the data, constantly revised and finally integrated into main categories. As for the type-building data structuring (see Figure 14) this category definition was established by defining the dimensions and the logic of the envisaged typology (step 1 and 2).

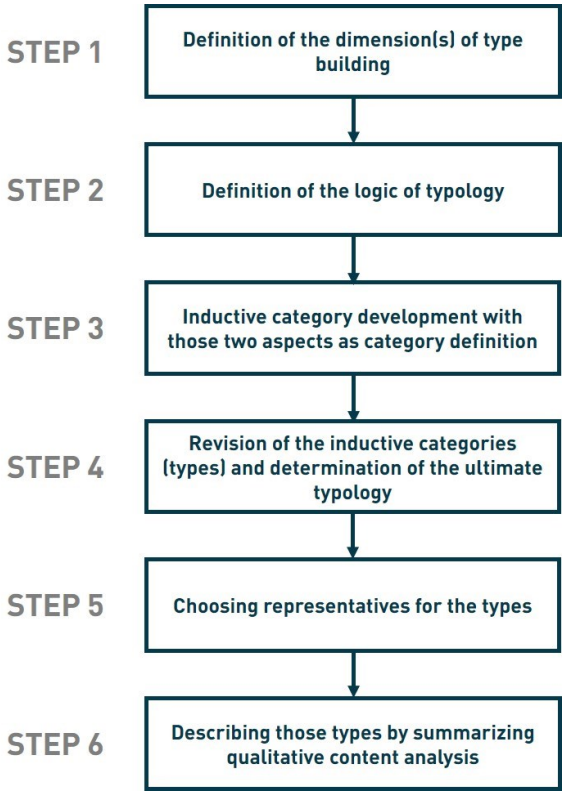

Figure 14: Steps of type-building content analysis (adopted from Mayring, 2014, p. 106)

The main type-building dimensions and logic resulted directly from the research questions. The researcher, therefore, analyzed the data to categorize managers' approaches based on 1) how they interpret their business environment (environmental frames) and 2) how they think about business model innovation (business model innovation schemas). Thus, the type-building content analysis directly draws on the open codes developed during the preceding deductive category assignment. The logic of type-building focused on developing types that provide the most value in terms of their capacity to advance theoretical knowledge in business model innovation research. Inductive categories (types) were developed that related and combine these two dimensions with each other (Step 3). Finally, representative interview partners were chosen for the different types (step 5) and the types were described (step 6), summarizing the results of the qualitative content analysis (see 6 RESULTS - Business Model Innovation Approaches in the Emerging Wearable Technology Industry). After codes and categories had been developed initially the researcher applied the two content structuring procedures again to the material. This form of intra-coder agreement tests the stability of research findings and is considered a formative measure of reliability in the traditional sense (Mayring, 2014, p. 111). Based on the comparison of the two results – which showed only small differences - the coding rules (units, category definitions, abstraction levels, coding agendas) could be validated.

5 SCENARIO ANALYSIS

5.1 Description of Key Driving Forces

POWER BOTTLENECK

One of the most pressing issues for makers of wearable technology devices is the availability of power storage solutions that strike a balance between functionality and wearability. Technology experts count on ongoing advances in the area of energy harvesting and storage solutions (e.g., lithium coin cells, wireless/inductive charging technologies, kinetic energy harvesting) to propel battery capacity, reliability and longevity onto reasonable levels. Electronics and materials innovations (e.g., MEMS, flexible electronics) could help eliminate safety concerns and pave the way for aesthetically pleasing and functional designs. Ultimately, developments in the area of advanced display, communications and sensor technologies (e.g., low-power LEDs and flexible display technology, ultra-low power connectivity platforms, low-power GPS and other sensors) will play a decisive role as consumers expect hardware that combines supreme battery performance, seamless functionality, and aesthetic appeal.

ENABLING TECHNOLOGIES

Strategists in the wearable space will look for progress in the area of micro-electronics (e.g., MEMS, integrated circuits, printable electronics, interactive tattoo implants) to prepare for a paradigm shift towards the need for robust, light, thin, flexible and stretchable electronic components of wearable devices with new form factors. Moreover, the industry hopes for breakthrough battery innovations (e.g., wireless

charging, energy harvesting, biobattery implants) and ultra-low power wireless technology standards (e.g., Bluetooth Smart) that would set the stage for a world of ubiquitous connectivity. Especially hardware makers anticipate to upgrade their value proposition as advances in materials science (e.g., smart textiles, advanced materials) and interface technologies (e.g., low-power LEDs and flexible display technology, natural language processing, gesture control) should improve many aspects of wearability (e.g., shape, aesthetics, safety) and usability (e.g., learnability, interactivity).

SECURITY CHALLENGE

The advent of wearable technologies has unleashed the next wave of consumer privacy concerns over the collection of personal data required for individualized, intelligent and contextual experiences. As with the majority of technology innovations, the level of consumer trust in novel technologies will greatly determine the acceptance of technology intrusiveness. This relationship will further be shaped by the instigation of precautionary measures and regulatory provisions with regard to data security and privacy in public and workplace settings (e.g., Google Glass bans, BYOWD policies, airplane usage). What is more, to overcome the security challenge all stakeholders in the wearable space are called upon to contribute to the resolution of personal safety issues associated with the ubiquitous use of wearable technologies as well as the interfacing of technology with the human body (e.g., driving with glass, compatibility and toxicity of implants, contact dermatitis).

TECH DIVIDE

The fast progression of digital emancipation has intensified the fray between digital natives and digital immigrants. This tech divide is mirrored in the formation of stereotypes related to early adopters of wearable technologies (e.g., "Glassholes", glass arrogance, the "chosen few") and in the emergence of counter movements that fear exclusion, surveillance and invasion of privacy (e.g., "Stop the Cyborgs"). All that goes along with a growing potential for consumer activism engendered by newly emerging technology-related diseases (e.g., technology anxiety and fatigue). The extent to which these societal discrepancies will solidify directly impacts the speed and breadth of consumer adoption.

DIGITAL HEALTHCARE REVOLUTION

The potential and momentousness of wearable healthcare applications constitutes a critical driving force in the wearable technology industry. The use of wearables (especially smart glasses) in hospitals and software applications (e.g., voice control checklist, video-based communication platform) could liberate physicians and facilitate faster and more informed decision-making. However, the acceptance of wearable technologies in healthcare environments depends on market actors' ability to negotiate the status sensitivity of medical professionals and to overcome privacy and image issues. On the consumer side, the acceleration of personal health monitoring (e.g., fitness tracking, Quantified-Self) and telehealth (remote monitoring devices and assistance) unlocks a huge market potential.

SUSTAINABILITY UPHEAVAL

Producers of wearables need to be aware of the enabling role of wearable technologies for breakthrough Internet of Things (IoT) applications that advance sustainable energy consumption and resource saving (e.g., smart homes, smart cities). In this context, a big opportunity lies in the re-education potential of the Quantified-Self movement that impels the transformation of consumers into more self-aware and health-conscious citizens (e.g., health and fitness tracking, productivity tracking, posture monitoring).

ROAD TO STANDARDIZATION

Industry players are challenged to revisit their business models in consideration of the speed and scope of standardization efforts between hardware (e.g., wireless charging) and software platforms (e.g., operating systems, enterprise software). Standardization could accelerate industry collaboration and growth and make for greater performance consistency of wearable devices. In this context, the advancement of wireless communications and low-power data exchange standards (e.g., Wi-Fi, Bluetooth, NFC, LTE-A,) is seen as a key factor for the seamless integration and interconnection of open systems. But as the industry evolves from a state of primordial fragmentation to maturity and consolidation, decision-makers must prepare for a variety of different standardization paths (open vs. closed vs. de-facto).

REGULATORY BATTLES

Business opportunities for wearable tech ventures are influenced by the degree and nature of regulatory measures (e.g., ban, statutory laws, vendor guidelines) to safeguard personal privacy and public safety. This includes issues such as the use of wearable devices in public places (e.g., driving with glass, airplane usage; glass bans) as well as in workplace settings (e.g., BYOWD policies, HIPAA compliance, and FDA approval). Here, data protection reforms that address the gradual disconnect between wearable technology and regulation (e.g., EU "data minimization principle", "right to be forgotten" and the right not to be 'profiled' without consent) will play a major role in defining the industry's legal playground. Likewise, regulatory approaches to contain health and safety concerns related to the progressive interfacing of technology with the human body (e.g., implants, contact lenses, contact dermatitis, battery fires and overheating) will leave an imprint on the public safety debate.

CONSUMER ADOPTION BEHAVIOR

There is still some uncertainty as to how consumer characteristics (e.g., personality traits, demographic, socio-economic factors, technical experience) will affect the level of consumer awareness and excitement. Therefore, the occurrence of "Tech Resistance" and "Calculated Pessimism" is to be observed closely. From a consumer perspective, frictionless adoption and long-term engagement are directly linked to the extent to which new wearable products are designed to address consumer needs and preferences in terms of baseline adoption criteria (e.g., quality / robustness, intuitive user experience, aesthetics) and human factors (e.g., fundamental needs, cognitive activity, physical aspect). Furthermore, managers have to be mindful of the way social

factors (e.g., opinion leaders, need for personal privacy) can influence the public debate and current of opinion surrounding wearable technology (e.g., aesthetics and privacy debates).

TECHNOLOGY USAGE PATTERNS

The role of technology in people's lives (e.g., everyday companion) and degree of interconnectedness of devices and data (e.g., "everything connected") will ultimately determine the degree of pervasiveness and contextualization of wearable technology (e.g., Quantified-Self, BYOWD, IoT). The degree of technology interweavement (e.g., technology embodiment, invisible technology) and technology individuality (e.g., technology as identity expression, blurring lines between fashion and technology) both present a critical facet of the relationship between humans and technology. The evolution of human-machine interaction and the adoption of novel user interfaces (e.g., glanceable user interface, holistic interface design) will have ramifications for the form factor debate , i.e. consumer attitudes regarding different mobile device categories (e.g., replacing the smartphone), the identity of wearables (e.g., multi-purpose vs. single purpose; stand-alone vs. companion) as well as the modularization of functions and forms.

EVOLUTION OF INDUSTRY STRUCTURE

The balance between collaboration and competition, including inter-industry relations (e.g., competition within the value chain, strategic partnerships) and cross-industry affairs (e.g., healthcare fusions, fashion attack) will affect the extent of industry fragmentation and its road to consolidation (e.g., niche, volume). In addition, each players' business model is dependent on the value chain capacity in the wearable technology industry, This capacity, in turn, is impacted by infrastructure readiness (e.g., ubiquitous broadband connectivity, cloud access); hardware component performance and cost (i.e., Moore's Law), and software innovation (e.g., form factor compatibility, user interaction alignment).

ECOSYSTEM COMPETITION

In terms of ecosystem competition, the defining question is how the "Clash of Titans" (Apple vs. Android Powerhouses) will pan out. The outcome of this battle will shape the nature of emerging product ecosystems (e.g., Apple, Amazon and Google universes), software ecosystems (e.g., iOS, Android Wear) and customer experience ecosystems (e.g., Apple Health Kit, Nike Plus).

5.2 Scenario Narrative: Vortex of Change

VORTEX OF CHANGE – Technology transcends the boundaries of the human body

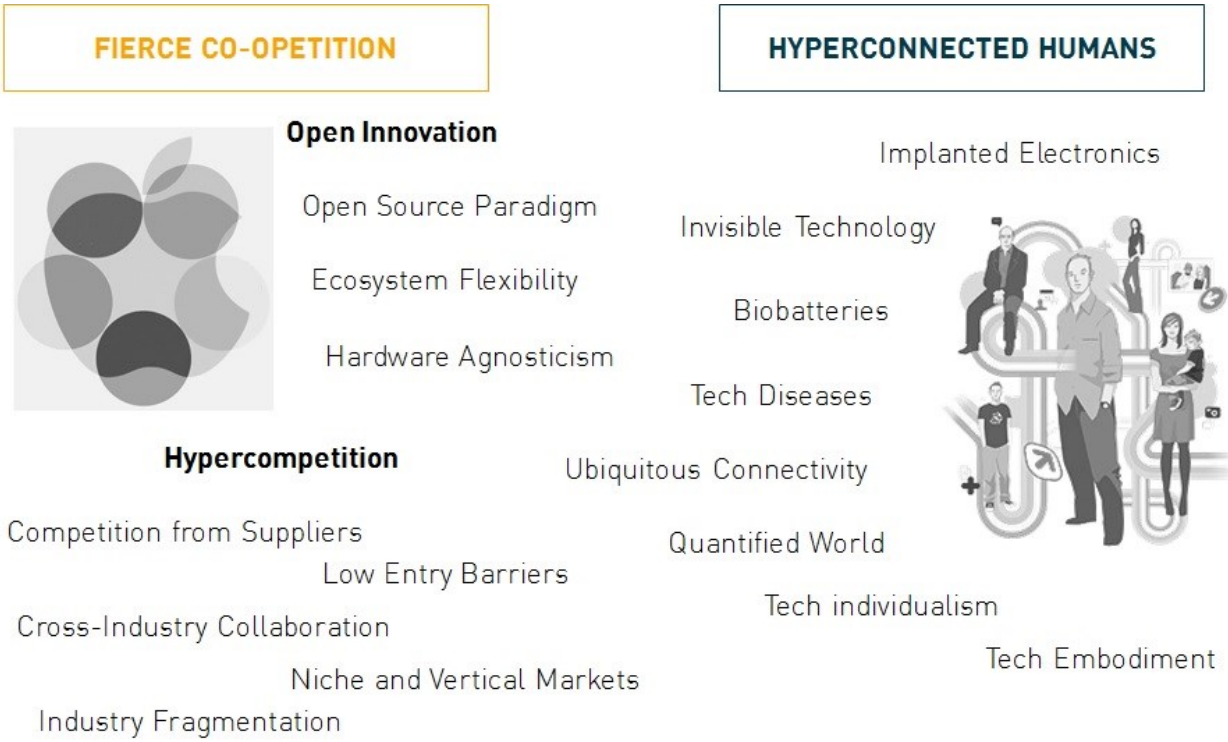

Figure 15: Overview of the "Vortex of Change" Scenario

The Human-Technology Nexus:

HYPERCONNECTED HUMANS

In this turbulent scenario, radical change is the name of the game. The interplay between human and technology has taken a flying leap of amalgamation. Advances in the area of energy harvesting and flexible electronics have unblocked the power bottleneck as wearable technology is fueled by biobatteries that mainly take the shape of implanted glucose fuel cells. The miniaturization and performance of electronic components have reached levels that make for the construction of invisible technology, blending in seamlessly with the human body. As natural language processing, voice and gesture control technologies have matured, human-machine interaction and inter-human communication have assimilated and the notion of user interfaces gradually loses meaningfulness.

The tech divide has softened: Over the previous years, wearable tech vendors have been consistently demonstrating their ability to cater to evolving and rapidly diversifying consumer needs and preferences; and thereby fostered mainstream adoption and long-term engagement. Consumers, on the other hand, have in large part shed privacy concerns and exhibit greater trust in the intentions of novel technologies. The

remaining current of tech resistance is primarily associated with an increased diffusion and magnitude of technology-induced societal grievances such as social isolation as well as new kinds of emotional and mental diseases. Nevertheless, the gap that had separated digital natives from digital immigrants has greatly shrunk.
In this world, technology fulfills two main purposes: optimization and self-expression. The majority of people have come to accept a life of ubiquitous connectivity and embrace technology as an everyday companion. While consumers have undergone a transformation into more self-aware and health-conscious citizens, wearable technology has catapulted the contextualization of content and services onto the next level. The all-encompassing collection and analysis of large volumes of data (Big Data) inspires a quantification of all aspects of life, which resonates well with a deeply entrenched human drive to optimize everything from people's health and their impact on the environment to the efficiency of work and manufacturing processes.
The pervasive use of technology has also evoked a sense of technology embodiment: Humans regard technology as an extension of their bodies and self. Thereby, consumers avail themselves of wearable gadgets as a vehicle for identity expression. As a result, the extent to which technology reflects a person's status, style, values or beliefs has emerged as the major emotional selling proposition in consumer electronics. In other words, the boundaries between fashion and technology have vastly blurred. As consumers immerse in a sense of tech individualism, the modularization of form and function as a means of mass customization takes on greater importance.

Ecosystem Complexity:

FIERCE CO-OPETITION

The clash of titans has come to a conciliatory end: Consumer electronics powerhouses saw their supremacy threatened by rapid and disruptive hardware and software innovations, predominantly brought about by an unprecedented breed of "holistic technology" startups. This growing group of agile and lean technology ventures expends aggressive, collaborative efforts to address highly complex and diversified consumer needs better than incumbent market leaders and thereby forces them to cooperate. Giving in to the intensified competitive pressure, Apple and Google had found themselves constrained to answer the call for more flexibility of software ecosystems. Open innovation has finally gotten the better of closed system thinking. Open source operating systems and open APIs have become the industry standard, which initiated a paradigm shift towards hardware agnostic software development.
Next generation Bluetooth and LTE have been established as official standards for data exchange and cellular mobile communications, which enables a seamless integration and interconnection of open systems. A small number of widely used open source software platforms form de-facto standards for developers. While the high pace of standardization in communications and software ensures wide interoperability for the end-user, the ongoing standardization of hardware components facilitates supplier specialization and increases value chain efficiency. The openness of standardization shifts the focus of innovation and industry competition towards user experience design (UXD), customer experience management and business model innovation. Moreover, a series of free-market liberal regulatory reforms, particularly in the areas of data

privacy and public health, have lowered barriers to entry and cultivated a fertile soil for hypercompetition.
The current state of market for wearable technologies is characterized by a high degree of fragmentation with competition approaching from all directions. It has become a common practice for component suppliers to compete directly with their customers (tech vendors) by investing in start-ups and leveraging their technological competences to build and market finished products on their own. In an effort to differentiate themselves, wearable technology companies create rich and far-reaching customer experiences. To do so, they often join forces with leading firms from adjacent industries, particularly in the form of healthcare fusions or fashion collaborations. Building on such cross-industry partnerships, small firms thrive in profitable niche markets. At the same time, wearable technology pervades all imaginable vertical markets, revolutionizing entire industries (e.g., healthcare, insurance, construction, professional sports) while expediting the rise of smart homes and smart cities.

6 RESULTS - Business Model Innovation Approaches in the Emerging Wearable Technology Industry

Qualitative content analysis of the entrepreneur interviews has yielded insights into how managers of entrepreneurial ventures make sense of an emerging business environment. Through the systematic examination of different aspects (attention focus, winning recipe, scope of analysis, and causal logics) of the managers' cognitive representations of the industry context, two broad types of *environmental frames* emerged from the data:

1. an inward-looking, defensive perspective and
2. an outward-looking, proactive perspective

Furthermore, the analysis suggests that founder and CEOs of entrepreneurial ventures in the emerging wearable technology industry hold *business model innovation schemas* that can primarily be classified as evolutionary or adaptive. The majority of interviewed founders and CEOs of wearable technology ventures exhibited a pronounced hesitation to formulate more radical business model innovation strategies. None of the interviewees mentioned the explicit intention to innovate "various components of the business model simultaneously" in order to "shape markets or industries by means of creating disruptive innovations", i.e. to practice *business model innovation* (cf. Saebi, 2014, p. 150). The managers explained their cautious stance on business model innovation as being mostly attributable to the high levels of dynamism and uncertainty in the wearables industry as well as well as the resource scarcity inherent in newly-created firms:

"This is kind of hard because I actually have not planned for a turbulent scenario in the future. I would like the scenario to become less turbulent. I hope the brand exists in an era of change towards less turbulence because I can't see how we can handle much more turbulence." (IP 1)

"Right now we have to earn money. So we have to act within what is going on in the market today and that is the fact that people need simple mobile phones." (IP 3)

"After all, we do not have the ability to react at such a fast pace and overturn everything overnight. At least not with the amount of resources we have at hand. If we have unlimited resources, perhaps then we can become much faster." (IP 4)

Another aspect that seems to curtail firms' intentions to radically innovate is the predominance of traditional hardware business models during these early stages of the wearable technology industry. By nature, a typical hardware development cycle demands much larger amounts of time and money than the average software iteration. Focusing on the hardware component of the business model appears to foster management's reluctance to alter core components and processes of the business model as a whole:

"One of the tricky things about the hardware space in general is that nothing happens that quickly. It is very difficult to make an incremental change. We try as hard as we

can to find as many little things which we can possibly fix; little change here, and little change there, to say this is something that would go a long way in a short value fix but some of the product side things take months." (IP 5)

"I think it is always going to be a step-by-step approach. Unless you are only doing software you cannot simply knock over everything and start from scratch. You can see that with a lot of app startups that start with something and do something completely different the next day. This approach does not work for us and I think that you rather dare to approach everything step-by-step." (IP 4)

The type building content analysis indicated a broad interrelation between how managers assess and interpret the business environment (environmental frame) and how they think about business model innovation (business model innovation schema). Based on the subsumption of codes from both areas, two main approaches to business model innovation in emerging business environments could be identified among the interview participants:

1. Defensive Evolution and
2. Proactive Adaptation

6.1 Defensive Evolution

6.1.1 Summary

Managers who approach business model innovation in the form of *Defensive Evolution* have an inward-looking environmental frame that is strongly shaped by the visions they have for their company as well as their winning recipes, i.e. their assumptions and beliefs regarding what determines success in the industry. Managers with a defensive environmental frame tend to focus on addressing specific consumer needs and create firms with narrow product-market domains. For those managers, business model innovation is often considered a means to strengthen or protect the current model and to reinforce core-repeated "guidelines" that govern their business model. Due to this inward focus, such entrepreneurs rarely feel the pressure to respond to environmental changes by making major changes to their business models.
Interview Partners with a "Defensive Evolution" frame: IP 1, IP 2, and IP 6

6.1.2 Environmental Frame

Attention Focus

Interviewees with a defensive environmental frame mainly focus their attention on **evolving consumer needs**. Often, their business idea is built around an insight as to which needs are unfulfilled given the current state of the market.

"And there is no cohesion about what people really do want to put on their bodies. An now there is a new generation coming through and they are highly aware of the state

that the world is in and issues that range from social to environmental. The fashion of that younger generation requires awareness of those issues." (IP 1)

"And it's that fusion between aesthetics and use that I think will lead wearable technology. Not just creating technology for the sake of it – things that people don't want to use. That seems to be one of the biggest battles in this market." (IP 2)

Having a decided opinion about what those consumers really want, the entrepreneurs are inclined to direct the **focus inwards**, emphasizing strategies for how to exploit their firm's **current strengths** to effectively address the specific needs of their targeted customer segments.

"In this turbulent scenario consumerism is still strong and alive, I guess, what company A would be doing would be heavy activism. So the products would intensify in that kind of role that says something towards the rest of the makers of unsustainable technology." (IP 1)

"We are a product company. We take pride and we believe that we are really good at building products. And what drives us in the wearable space is intuitive innovation. We believe as long as this is our strength and as long as we stay true to that, our users will appreciate what we are doing." (IP 6)

Winning Recipe

Consistent with the explicit focus on catering to consumer needs, the interviewees in this category regard the ability to **"make wearables wearable"** as the key to be successful in the wearables industry. This underscores the managers' emphasis on user-centric value creation.

"I can't believe that there is a lot of products out in the market place that consumers just don't want to wear." (IP 1)

"Wearable technology, in my belief is going to be led by a practical application or aesthetic application. It's not just for the sake of it. I don't believe people just want to wear something…A lot of the wearable technology in my humble opinion isn't wearable. If you don't make it wearable, it will never be worn." (IP 2)

For these entrepreneurs, enhancing the wearability of technology involves approaching wearables from a **fashion angle** that highlights the aesthetic aspects of products rather than treating them as technology gadgets.

"So we feel that this is the future of fashion. This is how fashion is going to evolve. And our focus in what we sell is also fashion. And I think that is the key for wearables to become mainstream. If they can break away from looking as gadgets, then they will become mainstream and they will become widely adopted. And all technologies go through that process." (IP 6)

"And no disrespect to a lot of things that are out there at the moment, but I don't think that a lot of people are going to walk around with huge cameras strapped aside of their glasses. It is going to have to be led by use and by aesthetics. And it's that fusion between aesthetics and use that I think will lead wearable technology." (IP 2)

"So you want to start making technology products that people want to put on their body; that they think are fashionable. And that's where I think wearable technology right now is just totally off course." (IP 1)

Scope of Analysis

The emphasis on the fulfillment of consumer needs is also reflected in the managers' relatively limited scope of environmental analysis which is mainly focused on influence factors in the environmental area of *Perception of Value*.

"What is the experience the user is going to get when using this? And for that, this technology kind of needs to be a natural extension of the human body. You have got to experience the technology rather than see it." (IP 6)

Causal Logics

A defensive cognitive frame prompts entrepreneurs to lean towards interpreting specific events in their business environment to be **beyond their control**. Accordingly, they point out their **dependence** on strategic actions of industry giants (e.g., Apple, Google, or Samsung) as well as on technological progress.

"So I guess, if I put company A into some kind of entanglement situation like that, what you'll probably find is not governments, it is going to be the tech giants that will push back on me in the sense of trying to regulate, if my idea becomes a serious competitor to them. They will try to utilize their platforms, software, algorithms as leverage against me from increasing market growth. There is not much I can do about it as a brand." (IP 1)

"In the speed of change that we are dealing with, we have to rely on the technology because of the mobile phone world which is the interaction that we've got at this point in time. We have to be blown with the wind a little bit and interact with whatever they are making. So we are not in the business of making mobile devices. We have to make our jewelry fit with technology, whether it's with BLE or it's with NFC or whatever." (IP 2)

This perspective also leads managers to think of their firms as **followers** who are forced to work within the technological playing field and ecosystem created by larger players and obey to the dictated rules.

"So we're not leading a market with this. We are following a market. We can adapt our technology to pretty much anything that's out there and whether that's a mobile phone or a tablet or a laptop. If that changes, we have got to adapt. But we are not

leading that market, we are following it. We are leading our own market in the actual adornment and how we interact with that and the services that we offer but there is no part of that that we can dictate." (IP 2)

"I think what seems to be happening is that there is so much innovation in this field that I think even the big companies can't keep up with the innovation happening in the small companies. And then the small companies are having to be led by the accessibility of the large companies, allowing people to interface with their developer codes, APIs or whatever they are using." (IP 2)

Despite deeming environmental changes for the most part as uncontrollable the entrepreneurs' future outlooks are characterized by the **anticipation of developments that favor their businesses**. This includes the persuasion that some of the critical issues (e.g., privacy issues, consumer adoption barriers) in the industry will resolve themselves as everything falls into place.

"And the second thing is, yes, there are some hurdles…You talk about big data, everything is about data. Privacy issues and such are concerns of our users. I think these things will automatically evolve in time. There will be a mutual understanding between the users, the policy makers and the device manufacturers. This will definitely happen." (IP 6)

In congruence with this observant, anticipative mindset, the entrepreneurs do not necessary understand environmental change as a trigger for business model innovation but mainly interpret a changing environment in terms of **how well they expect their current models to work under the new circumstances**. Thereby, they show a tendency to rationalize how industry developments **substantiate the effectiveness of their current model** as opposed to devising alternative adaptation strategies. This reasoning can be regarded as an important cognitive component of an *interpretation-driven* environmental frame which leads managers to "construct their environments through their strategies rather than developing strategies in response to environments" (Nadkarni & Barr, 2008, p. 1398).

"But I think what is interesting is that a part of the idea is actually a possibility for me: I see these tech giants serving their sort of natural end at the moment. Because they are so focused on competition amongst one another, they are ignoring the actual value of what they are making. And that is something that is happening incredibly with Apple, post Steve Jobs. The products no longer represent the value of what they did. So the best thing for company A to do in an environment developing like this one where there are definitely walls beginning to break down, would be to continue to stand by the integrity of the products and business model because I think that that would be the standard more than the product definition." (IP 1)

"I think company could really do well in this sort of scenario because it sounds like there is a certain "entropy" with technology innovation, which means that the cutting edge technology components are available. If I reapply those to building something

beautiful, sustainable and functional then, I think, there will always be a place in the market for that." (IP 1)

6.1.3 Business Model Innovation Schema

Role in the Firm

When asked about the main purpose that business model innovation fulfills for their firm, entrepreneurs with an evolutionary cognitive schema mostly singled out the importance of putting their company in a position that enables them to exploit opportunities and **react to changes when they arise in the future**. This reasoning seems to be attributed to the high degree of uncertainty regarding future developments, which the managers plan to address by staying alert to changes and thereby **maintaining a certain flexibility** in their business model.

"I've always believed in keeping it simple. I think no matter who you are, nobody really knows what is going to happen going forward. You use your intuition, you use your understanding of things and you make calls based on that. So we feel that this is the best way to move forward. And what we plan... We plan all of this but we keep ourselves nimble. So that tomorrow, if we have to adapt to change, we can do it. This approach allows us to react to any surprises the market may throw at us." (IP 6)

"I feel kind of passionate about this area. I could see it emerging as the new bubble. And I kind of believe that there needed to be a brand present there that reflected what I think is going to happen anyway, which is more sustainability, a full circle when it comes to developing products or harvesting value from a market. I kind of see it happening. Not sure when but I think it will happen eventually. So I just kind of try to drive a wedge into that place." (IP 1)

Planned Outcome

While trying to keep their options relatively open, decision-makers that adhere to a cognitive frame of the Defensive Evolution type focus on maintaining and **improving the existing system of activities and relations**.

"There is not an awful lot in there that would really impact our business model. I suspect jewelry itself haven't got a method to really change that much in thousand years. We are making an inanimate object animate. So we are basically making wearable jewelry. So we are not trying to be visible or trying to blend with the human body. The only thing I suppose again is the message of delivering emotional messages as a method of capturing emotion, experience and memories. So there is not much in there that would really impact us in any way, shape or form, because were are not trying to miniaturize and make something invisible. We want it to be visible." (IP 2)

"If we were making fridges and TVs in a 150 years from now, the think that what company A would have to do to continue to cut the edge would be that heritage and

history of being a brand with integrity and reliability. So that would become the new branding in a situation like this which would be the heritage, the reliability, the timelessness of the brand." (IP 1)

The initial business model of young entrepreneurial ventures is often built around a greater vision according to which the entrepreneur develops a set of principles and core guidelines regarding how he wants to conduct business and what it takes to be successful. Entrepreneurs with an evolutionary business model innovation mindset seem to be more **reluctant to deviate from that vision and principles.**

"As far as wearable technologies and having access to information, I find it all fairly dumb and pointless. And, to be honest, I hope my great-great grandson is still running the company in a way that is a bit of an insult to the tech giants, which then probably would still exist. I still hope my great-great grandson is a punk who is running the business the same way that I am, trying to kind of shift to the standing that we should not develop tech that we do not need." (IP 1)

"But competition is not a bad thing. As long as we do what we are currently doing and we stay true to our philosophy about design and how we want to build our products… So we focus on high quality standards and aggressive pricing. So we feel, if you tie that into our philosophy for building products and you give a value proposition to a user, I think that would really help us keep and maintain our user base going forward." (IP 6)

Scope

In correspondence with the notion of *business model evolution*, "the scope of change is limited to a few areas at a time and does not significantly alter core-repeated standard processes of the firm's business model" (Saebi, 2014, p. 150). The few considerations to innovate the business model are mainly concerned with the attempt to extend the existing model in order to **explore new revenue streams**.

"Yes, in our organization we have a bunch of highly creative people but imagine, if you expand that globally. When you go to the world and say listen guys, this is a platform and this is what we can do. You have all of these sensors, this and that, and we are giving you something. Build an application! So not only is the selling of the product a revenue but the services that can be sold along with that product. And then you can get into revenue sharing where the guy who develops the app also becomes a stakeholder in this ecosystem. So I mean that's how we look at this going forward as well. And I think what the smartphone has done in terms of apps and ecosystem is a good starting point in terms of where we go from here. So services is also something for us." (IP 6)

Process

This evolutionary approach further involves an inclination to **confine the analysis to available resources** and **proven industry trends** in order to slowly make adjustments where necessary. This implies an incremental approach to business model innovation whose scale and scope are closely **linked to enabling environmental factors**, particularly technological developments.

> *"The technology is not there to make a beautiful stand-alone device. Any of those stand-alone devices are like Nokia phones, they are massive. In a sense right now there is not really anything out there that is really revolutionary. It still requires your smartphone to be in your pocket and if that is the case, there is no point in having a whole range of duplicate functions, which most of the smart devices do. Until the technology that you are putting on your body is actually improving the whole interaction and technology is increasing the speed with which you can engage with information, it is not going to happen. I am kind of taking that point and go back and looking at innovations that were made a couple of years ago and try to build a user interface and a user experience that focuses on very simple means. So using existing technology to be fashionable."* (IP 1)

> *"So the challenge is definitely our efficiency. And you named it. Energy Harvesting or biobatteries or whatever. That is definitely a challenge but at the same time within these challenges lie opportunities for people like us to come in and build products of value. So it is kind of an interlinked situation. And there is a lot of research that goes into different types of power technologies and that could really impact how wearables evolve or the rate at which they evolve going forward. I look at these as interesting opportunities for us to get in and do stuff. So if these problems that I mentioned, if they affect us in some way, what they do for us is, they kind of give us directions in which we should innovate. And we do have a significant amount of our resources that is working on different problems within this area."* (IP 6)

6.2 Proactive Adaptation

6.2.1 Summary

Proactive adapters base decision-making on a more outward-looking environmental frame that is characterized by a distinct intent to identify and seize opportunities in the business environment through the constant reassessment of environmental conditions. Such entrepreneurs take into account more different dimensions of the business environment when evaluating the current state and future effectiveness of their business models. In doing so, they concentrate on finding ways to clearly differentiate their offerings from the competition. Although these type of managers also try hard to retain the main idea and core vision of their businesses, they proactively test their assumptions against changing conditions and are prepared to explore new ways of value creation, delivery and capture based on evolving needs.
Interview partners with a "Proactive Adaptation" frame: IP 3, IP 4, and IP 5

6.2.2 Environmental Frame

Attention Focus

The interviewees that fall into the Proactive Adaptation category have a more outward-looking perspective when it comes to business model innovation. They analyze the development of the industry as a whole and show awareness of a wide range of influence factors that affect the areas of *Perception of Value*, *Ecosystem and Value Chain*, and *Market Attractiveness* (cf. Kamprath & Van den Broek, 2015). Despite this diverse point of view, primarily focus their business model decisions on **competition-related developments** in the industry.

"The business environment that I am sensitive to is the competition." (IP 3)

"It is my goal to win more customers and to not lose any customers to my competition" (IP 4)

The entrepreneurs permanently sense competitive pressure and use the offerings and performance of **competing industry players as a benchmark** against which they measure the viability of their own business model. From the analysis of competitors, the proactive adapter identifies opportunities that mostly arise from other firms' inability to effectively conquer the market.

"I think the wearable space is incredibly fascinating right now. For a number of reasons. The most intriguing is the fact that no one has really answered the question yet. In other industries, you have industry standards where you say you can look at someone and say this person has really nailed it. I don't think anyone in the wearable space can say they have solved the issue yet. The early market trends have said there is something here, there is a market, there are people who are interested but retention data and sales data from other businesses say that no one has done it right. No one has really answered the bell properly yet. It's an incredibly interesting space to be in because there are a lot of players and a lot of people trying to answer the question and I do not think that anyone actually has the right answer yet." (IP 5)

"So yeah, like any startup we consider ourselves an underdog but I think our competitive advantage is to give us a distinct opportunity against folks that are really trying to compete in the heavy technical space, which is something we try to avoid." (IP 5)

"And if competitors come in and they all offer the same thing, the look and feel of the product will be the determining factors." (IP 4)

Winning Recipe

The interviewees in this category shared the persuasion that **competitive differentiation** is the main foundation for success in the wearables industry. The notion of "being different" mainly refers to a firm's ability to either be the first to address a particular market need or to outdo the competition in terms of price or value created for the customer.

"Company C has to be different in order to succeed and right now there is nothing in the market like it. So we still have an advantage here." (IP 3)

"I think with the company E we have a really interesting and unique opportunity to fill a void in the current market but there is always going to be a market that is oversaturated with products that are overly complex for a certain portion of the market and we are going to be able to come in regardless of what the sector is and say here is a way we can do this better or more cost-effectively." (IP 5)

"So at a later stage we plan on bringing in the new algorithm that takes temperature as the main input. This will be something that no one else has. It will give us a real USP, a clear competitive advantage." (IP 4)

Proactive Adapters did not formulate definite winning recipes. Statements such as "answer the bell properly" or "be different" do not imply clear, predetermined goals and directions, which leaves greater leeway to pursue a variety of different strategies and explore numerous alternative business model configurations.

Scope of Analysis

Moreover, such entrepreneurs demonstrate a more holistic view on the industry. When faced with prospective changes, they **systematically scan** the different change areas (*Perception of Value, Ecosystem and Value Chain, Market Attractiveness*) in order to grasp the ramifications for their business models.

CONSUMER NEEDS:

"This is very market-dependent: If we are targeting the segments sports, medical, and industrial safety, the sports market works a little bit different. On the one hand, you have real athletes who train hard and rely on the data to optimize their training. And then there are sports enthusiasts and I think this segment is the one where the product simply has to look cool and convey a certain life-style." (IP 4)

"The enterprise portion of this business is reacting to exactly that. We have a unique opportunity, both from a design and a cost standpoint to do exactly what they are saying through identity expression. We design the product in a way that makes it highly customizable, highly brandable for organizations and at the same time our cost makes it very easy for us to walk into a business and say: 'You guys should buy this device as opposed to that one'. The value proposition is just much higher." (IP 5)

CONSUMER ADOPTION BEHAVIOR

"But going a step further than that, we believe that mainstream adoption is a really interesting thing. The portion of the market that owns devices now very much are the early adopters who have gone out and said, 'wearable tech is on the forefront, I am going to go buy this thing'. There is a portion of the market that doesn't know it exists at all that we think we can really hit with our standard products. And then there is a portion in the market that knows it exists but for whatever reason has not decided to get involved. Whether it is not something they are interested, or they don't want to track the data, they don't want to spend that much on it...And that portion of the market is only going to be reached, if the product is just physically handed to them. But people and the current players in the space aren't going to reach those folks with the current style of products cause for whatever reason they have looked at them and said, 'we are not interested'. We have an opportunity to take those people who said they are not interested and say, 'now you don't have a choice, you are part of this organization, you are part of this group and now you are going to wear this thing for that reason'". (IP 5)

COMPETITION:

"So if we look at the "Vortex of Change" now: Assuming there are competitors on the market that also measure the core body temperature, the services built around the hardware and data and the life-style issue will gain importance. Simply because the competition is there." (IP 4)

"Another aspect is the fact that a lot of simple phones today are really old. When we think of simple phones today, it is the feature phone. But that is not a very modern approach to the idea of a simple phone. So with the rise of smartphones there has grown a stage for a new concept of simple phones." (IP 3)

ECOSYSTEM DEVELOPMENT:

"It would be important that portals such as Google's or Apple's Health Kit are open because this also benefits us. We simply do not have sufficient size and everyone will jump onto those portals. However, I do not see it as a disadvantage to integrate with those portals because many people are already familiar with this territory and like using it." (IP 4)

"I think open APIs offer a huge opportunity for us. If people can use other platforms, they are going to look for the easiest and cheapest way to do that. If a company wants to use a platform that offers more functionality than we do, we still offer a fantastic solution to them at such a reasonable cost."(IP 5)

TECHNOLOGY:

"The technological aspect of that is that for the first time every chip sets are really small. And we can do new cool things with them. Based on the fact that I am

developing a very simple communication solution – company C is just a one-button wearable talking device - …And as the human-technology nexus becomes more prevalent we will see how really cool functions begin to become acceptable via voice recognition and the wearable one-button voice-commanded company C device is going to be positioned perfectly for implementation of that type of software." (IP 3)

REGULATION

"While we continue to consider the medical sector as an interesting segment, we have deferred plans in this area for now because it takes much longer to enter this market. The market is very conservative and we simply do not have the resources, i.e. time and money, to invest in the medical approval process and then wait for revenues to come in until we can survive. That's why we focus on the sports segment for now." (IP 4)

Causal Logics

When interpreting conditions and specific events in the business environment, Proactive Adopters express a greater **sense of control** of the overall situation. The general belief that industry challenges are rather predictable and manageable indicates that these managers expect that they can at some point **shape industry change** through their decisions and actions.

"And what you see in the wearable space is that it is very capital intensive. It needs to be real. So the competition is not coming out of nowhere. The competition isn't coming every day. I am not turning on my computer every day and finding 15 companies in the world that no one has ever heard of, doing the same thing. I know exactly where the competition is coming from and the titans, you know these are the biggest guys out there. I can sleep easier in this space, knowing that I can predict where the competition is. This is not some kid in his basement who put together the next big social network that is going to take us down in a day because it takes time, it takes money and there is a lot of road blocks especially from the cost to manufacturing and supply chain stand point; to say that the competition is a little bit more predictable than you see in other industries, which doesn't mean it is any easier. We are still going up against the massive players in the world. That doesn't make our lives any easier, but it makes it a little bit easier to predict at the very least." (IP 5)

These managers tend to interpret the business environment in terms of which **opportunities or challenges arise from changing conditions** and how they should modify their business model now to create better fit. Proactive Adopters, therefore, exhibit an environmental frame that is rather *environment-driven* which means that they "first seek to identify environmental demands and then develop strategies in response to them" (Nadkarni & Barr, 2008, p. 1398).

6.2.3 Business Model Innovation Schema

Role in the Firm

For proactive adapters business model innovation is an **integral part of business development** and strategic decision-making. They have a clear and fine-grained understanding of the assumptions that underlie their current business model and recognize the importance of revisiting it on a regular basis.

"I mean I think about it [the business model] every minute, every day, and every hour." (IP 3)

"I am not trying to fool myself here. Even now, we change our business model quite often. I believe that we definitely have to adapt to changing circumstances. When we started, we wanted to offer everything. A sensor, a data logger, and a desktop software that analyzes and visualizes the data. But soon we saw that no one needed the software or the data logger. Everyone only wanted the sensor. It is like that: You have an assumption and then you go one step further and realize that something else is needed and that you need to focus on different things." (IP 4)

Planned Outcome

The entrepreneurs in this category also showed an inclination to **hold on to their initial vision** and foster a specific set of core guidelines. At the same time, however, they emphasized their willingness and readiness to adapt various different components of their business models so as to **attain alignment with the environment.**

"It's always going to be about simple communication. We have these screens in our pockets and in our iPads that steal the attention of our eyes and minds and it would be interesting if we could alleviate that burden by giving ourselves software and hardware that enables us to be more focused in the presence, which is what I want to do. And this is what I am doing right now with company C - the walky-talky for a cellular network - and that's also what I like to be doing later on with enhanced software solutions." (IP 3)

"At the same time though, with that use case, there is still going to be the need for someone to get large groups of people moving together. And what we are trying to do, especially on the enterprise side of things, is to get large groups of people inspired to move at a reasonable cost. And even if all the technology is built into the human body, we are still going to need to be that platform or that organization that is out there that is incentivizing large groups of people to move and we still feel like there is going to be a niche there for us. But again our long-term goals aren't necessarily rooted in the wearables space. And if the wearable space eventually becomes what this scenario has mapped out, which I believe it will, we'll be in another space at that point where we can do the same thing and take the same guidelines that we take with the company E and make another sector more efficient. There is going to be a lot other elements to it but even as we sell other products and as we move away from this

bracelet, we are going to be able to keep the same guidelines and the same overall business plan to say: Let's get people moving at a reasonable cost. There will still be that ability to do that." (IP 5)

"We and in our language are very careful to keep our product roadmap very open-ended. We are not going to live in the wearable space forever. If ten years from now all this stuff is seamlessly built into ourselves, we'll have a different product that is still current with the times. We are not trying to sell wearable devices if everyone is having data streaming products built into their bloodstream." (IP 5)

Scope

Entrepreneurs with a proactive cognitive frame imagine **very specific ideas** of how to adapt their business model in the light of a changing business environment. For the most part, the managers plan to implement these changes **gradually** as they attempt to **align their business model to new environmental conditions** brought about by substantial alterations in the industry. The range of suggestions and plans **covers many different areas** of their business models. The interviewees, thus, devised business model innovation approaches that affect their firms' revenue model, industry model and enterprise model (cf. Giesen et al., 2009).

INDUSTRY MODEL INNOVATION:

"I am thinking a lot about the brand and how the brand is positioned to the different customer segments. We were talking about kids – and company C is a kid's product from day one – but we are also aiming to get this product out in the market for elderly and for athletes." (IP 3)

REVENUE MODEL INNOVATION:

"I am always thinking about the revenue streams and how we can make more money off of company C. Not only by selling it on a per-unit basis but also making money off of the apps. Everybody who uses company C needs a simcard and a subscription with a telco. And we are constantly trying to figure out ways to hack into that revenue by doing revenue shares. Maybe we can charge a licensing fee or something for the software and maybe there are ways to bypass the telcos, so we do not need their sim cards anymore but would be charging people a monthly fee for being able to make calls or something. We'll figure that out later. And in that case, we will be earning way more off of software and connectivity than we will be making of the hardware. So it would be more software-based. Basically, the vortex of change you are describing says that company C is going to be used more intensely on a much more intimate level. And then we would be charging people for the software use, not only the hardware. So we would be making and selling software." (IP 3)

"What we will certainly have to change in this "Vortex of Change" is that we become more of a lifestyle product. Our roots are in the medical space. The sensors actually do not look that bad as they are right now but it is not yet what I imagine a fashion or

adornment product to look like. And beyond that, what we should do as well is to build much more services around it. So not just offering the hardware but also customized training and recovery programs. We see hardware as the starting point around which you have to build the whole experience" (IP 4)

"What we see for the future is primarily the integration of the core body temperature with other parameters. Once we have a working algorithm we can propose the users how other parameters should be if they want to reach their goals. We will than incorporate this feature into a new version of the app and sell it for a price or even sell the API to other app developers in order to generate a large cash flow either by selling the app or licensing out the API." (IP 4)

ENTEPRRISE MODEL INNOVATION:

"So, if someone wants to use Strava or the Digifits in the world that offer a lot on the software side of things, our ability to come in and say we are using our product with that open API and us being able to integrate with them still offers you a lot more value than you get from using something else. So this type of scenario is where I do think this is going. I think open APIs are certainly becoming the norm and the industry standard." (*IP 5)*

"If we look at ecosystems for our product, the most critical consists of the type of portals that integrate data from different parties and allow you to consolidate and compare your fitness data across time and with your peers. This is exactly what Google does. So we do not necessarily want to build our own portal but our strategy should rather be to exploit these platforms and link to them by transferring data from our app to Apple's or Google's Health Kit, if the user wants that." (IP 4)

"And what we also plan, of course, is our own online shop but then also selling through partnerships with for example Runtastic. So we see other apps as a huge factor to drive hardware sales. Partners such as Runtastic that have a hardware store attached are very important for us. This way our sensor could be offered to all Runtastic users." (IP 4)

"Given we have 3, 5, or 7 million units sold annually, we will be in a position to talk to Baidu, Google, Apple or Microsoft about implementing their smart voice recognition services in our hardware platform. "When we are in a position where we already have a simple communication device on millions of people's arms, then it'll be interesting to explore these types of partnerships." (IP 3)

"And where we see long-term engagement and mainstream adoption coming into play is by taking these folks and finding the people who control them. The companies, the charities, the places that they engage with and sell to them to then trickle down to sell to those folks. So we are not going to directly trying to sell to you, if you decided to for whatever reason ignore the wearable trend but we are going to put products in your eye line through places and people that you are involved with and hopefully the trend trickles down to you in a way that you don't have to pay for it. And once we have you, we've got everything we need. Someone has paid for the device and then we get

the data and can continue to work with you long-term. So when we talk about mainstream adoption and long-term engagement, our approach is a little bit different for how we reach these people. We are not going to try and sell them directly. We are going to take a different approach." (IP 5)

Process

The process through which this adaptation takes place can best be described as a **gradual, step-by-step, iterative adjustment** aimed at "attaining alignment with the environment" (Saebi, 2014, p. 150).
Although this approach involves **proactive** planning and initiation of business model change processes, the managers **rarely express a sense of urgency to react quickly** and enforce radical changes.

"I think it is important to adapt to these changes when they happen." (IP 3)

"And I think in the short term our opportunity is still at a point where have some time to adjust to a world in which that will be reality. I don't think I am going to wake up tomorrow and magically something like that will exist. So we are always looking and being super proactive about where we want to be 5, 6 months from now. So we can get out in front of that stuff. But it's a little combination of both: short little quick-term fixes and then long-term product things that could have lasting impacts on the brand and the company and the product." (IP 5)

Often the constant **testing of assumptions against customer feedback** and market data lies at the core of this systematic decision-making. This process is focused on continuous organizational learning. Drawing on the collected information, decision-makers implement a **gradual sequence of consistent steps** that focuses on making **one significant business model change at a time.**

"So today I am making a solution for the kids and tomorrow I will be expanding it towards the elderly and athletes and in 5 years, maybe 8 years, we are going to start to implement software with really cool assistance. So it is going to become a richer experience to wear this device. And in 50 years, I have no idea what is going to happen. Nobody knows." (IP 3)

„Despite us being a startup we still rely on a gradual step-by-step approach and do not change completely from one thing to the other. This is also what happened with the introduction of our app: We never wanted to introduce our own app. The idea came up about six months ago because we simply talked to the people and learned that they want this app. And now we have this app, in a second we came up with this second idea: to sell hardware through the app. So we are offering the app for free but use it as a distribution channel to sell our hardware. Originally, we were all about hardware and we see more and more that we have to adapt. We probably do not have to switch to software all the way but we also cannot entirely ignore the software component." (IP 4)

Given the strong focus on competitive differentiation, valuable learning also arises from **inspecting the competition**. Here, the entrepreneur takes advantage of a **follower strategy** by avoiding mistakes that others have done before.

"We can look at the failures of others and react as opposed to people who were first to the space or were trying to be pioneers. We can take the mistakes of others and really learn by example. I think, as we built this product and we built the product fairly quickly - we came from the idea to market in under a year – we can look at the flaws of others and we've done it throughout the process of R&D and building the thing and learn from the trials and tribulations that others have faced. That is a big competitive advantage for us. I think we are at a disadvantage being that were are undersized, no one knows us and we don't have the brand recognition but as long as people continue to innovate in the space, we believe that we can drive adoption by solving some of their issues. However, you never want to rely too heavily on others. We are not going to take our entire business model and build it around the mistakes of shortcomings of other companies. But it's a really good way to fact check what our thinking is. If we can come up with assumptions and base our actual learnings on what other companies have done... We have our own set of assumptions and we can fact check those against real life scenarios that other companies have been through. So if we believe high price doesn't work out for some of these companies, we can look at real data of companies that have been before us with high prices. If we believe that a certain feature doesn't really resonate with users, we can look at previous feature sets of other companies. And we have the blessing and kind of the gift to being able to do that. So we have our own list of assumptions, we have our business model that we have put in place separate from what other folks are doing but we do have the ability to look at the bigger picture and say, here is what works, here is what has not and move forward based on that." (IP 5)

7 SUMMARY AND DISCUSSION

7.1 Summary of Key Findings

This thesis integrated the strategic entrepreneurship perspective with the cognitive perspective on business models to explore how managers think about business model innovation and how they take into account the business environment when developing their business models. The methodological approach featured a combination of the scenario method and qualitative vignette interviews, which allowed the researcher to have some degree of control over the nature and scope of environmental stimuli the entrepreneurs could react to. Also, the purposively selected sample showed homogeneity regarding the interviewees' role in and knowledge of their firm as well as the affiliated industry, market segment, and firm type. The research design, thus, ensured that, from an objective angle, the entrepreneurs face the same environmental conditions (e.g., dynamism, uncertainty, munificence) and also have to cope with similar challenges in terms of organizational and business model development. This common, objectified frame of reference allowed the researcher to better single out the impact of strategists' subjective interpretations and perceptions of environmental conditions and events on their approaches to business model innovation. The key findings are summarized in the form of theoretical propositions.

Two types of cognitive approaches to business model innovation in the wearable technology industry emerged from the analysis: *Defensive Evolution* and *Proactive Adaptation*. Even though all entrepreneurs operated in the same environmental context – the emerging wearable technology industry – and were subjected to the same standardized stimuli ("Vortex of Change" scenario) during the vignette interviews, the elicited approaches differ greatly in terms of how managers interpret the business environment, i.e. their environmental frames (see Table 4), and how they think about business model innovation, i.e. their business model innovation schemas (see Table 5). The distinctiveness of the two identified approaches supports the argument that inter-firm differences in business model innovation cannot be explained exclusively by the environmental context but are also attributed to the managerial cognitions that drive the behavior of strategic decision-makers.

P 1: The environmental frames and business model schemas of high-level decision makers in entrepreneurial ventures help explain differences in business model innovation among competing firms within the same industry.

Furthermore, the consistency of cognitions within each group gives reason to assert that managers' business model innovation schemas are closely linked to their environmental frames.

P 2: A manager's environmental frame is closely linked to her business model innovation schema.

The environmental frame of the Defensive Evolution type is more directed inwards. Such managers focus their attention on their firms' current strengths and resources and tend to closely stick to the vision and core guidelines they have established in their firms. As they expect to be successful by addressing unfulfilled consumer needs, the

scope of their environmental analysis is mostly limited to influence factors in the *Perception of Value* area. Further, they often show interpretation-driven causal logics with regards to the relationship between the business environment and their business models. Therefore, they interpret most environmental events to be beyond their control and assume a dependence on the strategic actions of bigger industry players. This goes along with a tendency to rationalize how industry developments substantiate the effectiveness of their current model.

P 3: The inward-oriented, interpretation-driven environmental frame of the *Defensive Evolution* approach hinders opportunity recognition and heightens business model rigidity.

	Environmental Frame	
	Defensive Evolution	**Proactive Adaptation**
Attention Focus	Inward; current strengths and resources; consumer needs	Outward; (future) opportunity recognition; competition
Winning Recipe	Addressing unfulfilled needs	Competitive differentiation
Scope of Analysis	Limited; focused on *Perception of Value*	Holistic environmental scanning
Causal Logics	Interpretation-driven; events beyond manager's control; dependence; following	Environment-driven; sense of control; manageability of events; reacting

Table 4: Environmental Frames – Defensive Evolution vs. Proactive Adaptation

The attention focus in the Proactive Adaptation mode is more outward-oriented, as such managers actively inspect the business environment to identify (future) business opportunities, especially from the development of the competitive landscape. In line with this, they view competitive differentiation as the winning recipe in the wearable technology industry and scan the environment holistically, looking at all areas of the business environment (i.e. *Perception of Value*, *Ecosystem and Value Chain*, *Market Attractiveness*). Their causal logics are environment-driven, which means that they assume business model change to be directly determined by conditions and events in the business environment. They feel a sense of control within the business environment, regard most events as manageable and, consequently, focus on devising adaptation strategies.

P 4: The outward-oriented, environment-driven environmental frame of a *Proactive Adaptation* approach fosters opportunity recognition and business model agility.

As far as the business model innovation schema is concerned, the Defensive Evolution type manager considers business model innovation as a means to reduce uncertainty and increase alertness to critical changes in the business environment. So when changing or innovating their business models, such managers predominantly seek to

strengthen or improve the existing system of activities and relations and to protect the current model. This is mostly achieved through incremental, necessity-based adjustments, which involve infrequent narrow changes mainly in the form of revenue model innovations.

P 5: The business model innovation schema of the *Defensive Evolution* approach favors a more cautious, necessity-based form of business model evolution.

	Business Model Innovation Schema	
	Defensive Evolution	**Proactive Adaptation**
Role in the Firm	Means to maintain strategic flexibility, reduce uncertainty, increase alertness	Integral part of strategic decision-making; focus on organizational learning
Planned Outcome	Strengthen, improve the existing system of activities and relations; protect current model, core guidelines and vision	Attain alignment with the environment; exploiting environmental opportunities
Scope	Narrow; limited by environmental factors and available resources; mainly revenue model innovations	Wide; potentially covering many different areas (e.g., revenue model, industry model, and enterprise model)
Process	Incremental, necessity-based infrequent adjustments	Gradual sequence of consistent steps; periodical, one significant change at a time

Table 5: Business Model Innovation Schemas – Defensive Evolution vs. Proactive Adaptation

For Proactive Adapters, business model innovation constitutes an integral part of strategic decision-making. They approach business model innovation from an organizational learning angle as they constantly experiment and test the assumptions their business models are built on. This group of managers regards business model innovation as series of permanent tests and experiments geared towards turning assumptions into knowledge. Their main goal with regards to business model innovation is to attain alignment with the environment and to exploit environmental opportunities that arise in the process. The business model innovation process is characterized by a gradual sequence of consistent steps and periodical changes that alter one significant business model component at a time. Nevertheless, the potential scope of business model changes is quite wide, potentially covering many different business model dimensions (e.g., revenue model, industry model, enterprise model).

P 6: The business model innovation schema of the *Proactive Adaptation* approach favors an experimental, gradual form of business model adaptation.

Finally, the data analysis revealed that the interviewed sample was very cautious in pursuing radical business model innovation approaches in the sense of changing "various components of the business model simultaneously" or shaping "markets or industries by means of creating disruptive innovations" (cf. Saebi, 2014, p. 150). This pronounced hesitation was partly attributed to the high levels of dynamism and uncertainty in the wearables industry, the resource scarcity inherent in entrepreneurial ventures as well as the predominance of traditional hardware business models during these early stages of the wearable technology industry.

P 7: For managers of entrepreneurial ventures in emerging industries, the high levels of perceived dynamism and uncertainty diminish their propensity to engage in business model innovation.

7.2 Contributions

The theoretical contributions of this thesis are diverse. First of all, this thesis puts forward a conceptual framework (see 2.3 A Conceptual Framework for Business Model Innovation in Emerging Business Environments) for business model innovation in emerging business environments that integrates a variety of theoretical concepts and ideas into an analytical lens. The framework contributes to a growing research stream in strategic entrepreneurship that regards business models as a firm's strategic response to their environments (e.g., Chesbrough & Rosenbloom, 2002; Holloway & Sebastiao, 2010; M. Morris et al., 2005; Voelpel† et al., 2004; Zott & Amit, 2007). In this context, academics widely agree that business model change occurs primarily as a consequence of disruptions in the firm's environment (e.g., Doz & Kosonen, 2010; Teece, 2010) and thus that "different environmental conditions need to be matched with appropriate adjustments in the firm's business model" (Saebi, 2014, p. 145). This notion of business model change - i.e. the continuous testing and adaptation of business model components in the light of changing environmental conditions – is broadly considered an important prerequisite for sustainable success (M. Morris et al., 2005; Teece, 2010; Bernd W Wirtz et al., 2010). In this regard, Bernd W Wirtz et al. (2010, p. 2) state that the successful adaptation of an established business model to new environmental conditions allows organizations to effectively exploit their resources and capabilities in order to create a competitive advantage. The presented framework provides a starting point for the examination of questions regarding when, how, and how much managers should innovate their business models in a given environmental context. It illustrates how management's decisions concerning the epicenter (industry, enterprise, revenue model) and the process (evolution, adaptation, innovation) of business model change can be affected by the environmental context, specifically by environmental drivers (e.g., relating to perception of value, market attractiveness, and ecosystem and value chain) and by environmental conditions (e.g., uncertainty, dynamism, munificence). The framework also suggests that, in emerging business environments, managers have to proactively engage in business model innovation and initiate the change process early in order to develop business model options that are consistent with different projected states of the future business environment. Moreover, the framework allows researchers to compare or combine the strategic

entrepreneurship perspective with other theoretical realms such as the cognitive perspective.

In addition, this thesis featured the application of the *Business Model Environment Template* (B-MET) (cf. Kamprath & Van den Broek, 2015) as an environmental scanning tool. The effective use of this novel conceptualization of business model environments as part of a scenario analysis of the wearable technology industry makes the case for the significance of a newly emerging research field hat is concerned with developing concepts and tools for environmental analysis, specifically designed to take account of the peculiarities and dynamics inherent in business models (cf. e.g., Osterwalder & Pigneur, 2010; Stampfl & Prügl, 2011).

As far as the main research questions are concerned, this thesis offers a number of qualitative insights into the interdependencies between industry context, managerial cognition, and business model innovation. Therefore, the findings add to the cognitive perspective in strategic management research. Via a case study of entrepreneurial ventures in the emerging wearable technology industry, this thesis empirically tests the applicability of findings on the role of managerial cognition in the environment-strategy relationship (e.g., Barr, 1998; T. S. Cho & Hambrick, 2006; Daft & Weick, 1984; Eggers & Kaplan, 2009) to the context of business model innovation. The research findings in this thesis generally suggest a moderating role of managerial cognition in the relationship between environmental conditions and business model innovation. Thereby, this thesis joins a relatively small group of studies (e.g., Kringelum, 2015; Martins et al., 2015) that emphasizes the importance of managers' subjective, cognitive representations and interpretations of the environmental context as well as of their assessments as to how critical conditions in the business environment induce innovations in the business models of their firms. The conceptualization of *environmental frames* and *business model schemas* adds to the theoretical understanding of how the cognitive perspective helps explain intra-industry variability in business model innovation.

In terms of contextual factors that influence the nature of business model innovation, the interviews specifically shed light on the intricacies associated with managing a young entrepreneurial venture in an emerging industry. In particular for entrepreneurs with a *Defensive Evolution* mindset, the perception of environmental uncertainty and dynamism as well as of resource scarcity seem to evoke a cautious view on business model innovation. These managers have a limited scope of environmental analysis and rather focus on reinforcing their vision and core-repeated guidelines that shape the working system of activities. These findings correspond to previous research that identified a manager's "dominant logic" (cf. Prahalad & Bettis, 1986) as a major cognitive barrier to business model change (Chesbrough, 2010; Chesbrough & Rosenbloom, 2002). Managers use this "set of heuristic rules, norms and beliefs" (Chesbrough & Rosenbloom, 2002, p. 531) when dealing with uncertainty and complexity to reduce ambiguity and simplify their decision-making. However, the dominant logic also functions as a selection mechanism in chaotic environments to filter out ideas and behaviors that go beyond the manager's previous experiences (ib.). Accordingly, Chesbrough (2010) argues that the success of established business models hugely affects the attention focus and information flow in a way that organizational routines and beliefs foster strategic rigidity. To that affect, the author argues that "following a 'dominant logic' can lead firms to miss potentially valuable uses of technology [which] do not fit their current business model" (ib., p. 359). What is

more, in highly dynamic environments, refining or "replicating" (Heij et al., 2014) a business model that has proven feasible under current conditions puts firms in danger of expending resources on improving capabilities that lose efficacy in the light of dramatic environmental upheaval. The resulting misfit between the refined business model and the rapidly changing environment can drastically decrease a firm's performance (Hamel & Valikangas, 2003). This thesis provides illustrative examples of this phenomenon in the context of the emerging wearable technology industry (see 6.1 Defensive Evolution).

With the depiction of *Proactive Adaptation* as another cognitive approach to business model innovation, this research adds to the evolutionary learning perspective (e.g., Chesbrough, 2010; McGrath, 2010; Sosna et al., 2010) by empirically substantiating the importance of business model experimentation in uncertain and complex business environments (cf. Casadesus-Masanell & Ricart, 2010; Chesbrough, 2010; M. Morris et al., 2005; Sosna et al., 2010). This emphasis on organizational learning can help mitigate the effects of environmental uncertainty and resources scarcity and give companies a competitive advantage (Blank & Dorf, 2012; Ries, 2011).

Ultimately, the empirical insights generated in this thesis assert the notion that decisions regarding business model innovation are highly contextual and are contingent on a variety of different factors. The two distinct business model innovation approaches depicted in this thesis represent some modified version of the business model change types suggested by Saebi (2014). Defensive Evolution can be considered a more cautious and rigid form of Saebi's *business model evolution* whereas Proactive Adaptation describes a more gradual, learning-focused version of *business model adaptation*. The fact that the business model innovation approaches of entrepreneurs in the wearable technology industry are not entirely consistent with Saebi's business model change types indicates that the contingencies between business model and environmental dynamics are not as unequivocal as implied by the rational positioning paradigm (e.g., Amit & Zott, 2001; Casadesus-Masanell & Ricart, 2010; Teece, 2010). As shown in this thesis, the peculiarities of specific industry contexts as well as cognitive factors can cause a continuous range of different types of business model innovation approaches. In sum, the theoretical considerations and empirical evidence contribute to the development of specific guidance on how entrepreneurial ventures can approach business model change in the face of environmental uncertainty and dynamism.

From a practical point of view, the future of the wearable technology industry is of great interest for a variety of different stakeholder groups. These include technology companies but also fashion labels, sports gear manufacturers and players in the health sector. The scenario analysis will reduce technological and market uncertainty for companies in this dynamic industry by identifying key driving forces (see 5.1 Description of Key Driving Forces) and projecting their potential impact in the business environment. The developed scenarios support stakeholders in the anticipation of the most significant future developments and thereby stimulate strategic conversations that enable decision-makers to develop strategic plans that effectively prepare their companies for success in the future.

7.3 Limitations and Future Research

The main purpose of this thesis was the exploration of new theoretical insights into the interdependencies between industry context, managerial cognition, and business model innovation. Given this exploratory focus, the research design featured a combination of different qualitative data collection and analysis techniques to illustrate a theoretical phenomenon (business model innovation in entrepreneurial ventures) in a relevant real-life context (the emerging wearable technology industry). In doing so, the key research findings (see 7.1 Summary of Key Findings) are summarized in the form of two distinct approaches to business model innovation (Defensive Evolution and Proactive Adaptation), focusing on the elaboration of the cognitive aspects (environmental frames and business model schemas) that shape these behaviors. The results contribute to a richer and deeper understanding of the investigated phenomena mainly through the suggestion of theoretical propositions based on which new research questions can be formulated to guide future research in the area of business model dynamics. Future researchers are well advised to take note of the limitations of this study when designing subsequent empirical investigations.

First, the findings of this study do not lay claim to statistical but rather to analytical generalizability. This means that the researcher strives to "generalize a particular set of results to some broader theory" (Yin, 2003b, p. 37). Critics generally purport that single cases inherently create an external validity problem because they offer a weak basis for generalizability. This reasoning, however, needs to be contrasted with the purpose of descriptive or exploratory case studies, whose sample is not expected to readily generalize to a larger universe, as is the case for survey research (ib.). It follows that the theoretical propositions generated in this thesis do not allow to draw direct inferences to the entire population of emerging industries but rather further the theoretical understanding of business model innovation under conditions of environmental uncertainty, dynamism and complexity. Future studies that seek to achieve statistical generalizability should follow a multiple-case design, which enables the investigator to test the theory by replicating the findings in other emerging industries with similar characteristics where the theory postulates the occurrence of the same results.

As for the generalizability of results, the small sample size might also constitute a problem. Although six in-depth interviews are appropriate for the exploratory purpose of this thesis, a larger sample size could help solidify the validity of results by allowing the researcher to achieve "theoretical saturation". Strauss & Corbin (2008, p. 212) state that theoretical saturation is reached when 1) no new or relevant data seem to emerge regarding a category, 2) the category is well developed in terms of its properties and dimensions, demonstrating variation, and 3) the relationships among categories are well established and validated. Particularly for the type-building content structuring (see 4.4.3 Data Analysis), more input data may have led to alterations in the formation of the two identified approaches to business model innovation, changing their characteristics or even adding additional types.

Furthermore, the reliability of data collection and analysis procedures could be approved upon in future research. While the stability (intra-coder agreement) of data analysis procedures was ensured by reapplying the research instruments to the material, reproducibility (inter-coding agreement) and accuracy of the findings were not specifically tested (cf. Mayring, 2014, pp. 111-113). If researchers are to apply some

form of qualitative content analysis in future studies, they should make sure to implement additional measures such as inter-coder checks and the computation of correlation coefficients between different coders. Such measures could contribute towards reducing biases and mitigating the impact of the individual researcher's personality and abilities.

Future research could build on the exploratory insights of this thesis to further investigate the relationship between business models and their business environments in an explanatory way. The analysis in this thesis focused on one moment in time (cross-sectional) which only allowed for the examination of the manager's current cognitive perspectives. Studies that want to analyze how environmental conditions and cognitive predispositions interact to form specific managerial behaviors and outcomes need to implement a longitudinal research design and compare manager's intentions at one point in time with their strategic actions at another point in time. Moreover, to establish correlations and causalities, research should refrain to quantitative research strategies that produce results with statistical power. A regression analysis could be used to substantiate some of the theoretical propositions put forth in this thesis. Besides, between-group comparisons (e.g., ANOVA or MANOVA) could be performed to analyze whether the differences in business model innovation approaches suggested in this thesis (Defensive Evolution vs. Proactive Adaptation) can be confirmed with statistic measures.

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9 APPENDIX

Appendix I: Interview guide with open-ended questions

ENVIRONMENTAL FRAME

1. COMPETITIVE MAP / INDUSTRY RECIPE

How would you describe the role of your firm within the wearable technology industry? (Purpose, Positioning)
What is the identity of your firm in regards to your customers and competitors?
In your opinion, what is the key to winning in the wearable technology industry?

2. INTERPRETATION OF SPECIFIC EVENTS (FACTORS)

Vignette Exercise:

- How and in what ways can such … changes affect your firm's business model?
    - Do you perceive … changes more as threats or opportunities for your business?
    - Do you perceive … changes as rather controllable or out of your control?
- Imagine, this scenario came true and these changes actually took place: How could you adjust your business model to account for the changed business environment?

3. INTERPRETATION OF ENVIRONMENTAL CONDITIONS

What role does the business environment play when you develop your firm's business model?
How would you characterize the described business environment?
How would you assess the business environment described in the scenario in terms of dynamism and uncertainty?
How do you think does dynamism and uncertainty impact your approach to designing your business model?

BUSINESS MODEL INNOVATION SCHEMA

- How would you describe your approach to business model innovation?
    - Planned outcome: Do you have a specific purpose or rationale behind changing your business model?
    - Scope: Evaluate based on Vignette Exercise
    - Degree of radicalness: Do you approach business model change step-by-step or prefer rather radical changes?
    - Frequency of change: How frequent do you make changes to your business model? (continuous, gradual, periodic, infrequent
    - Degree of novelty: When changing your business model, how important is it for you to develop entirely new ways of creating, delivering and capturing value?

APPENDIX II: SCENARIO VIGNETTES

Ecosystem and Value Chain

1. Advances in the area of energy harvesting and flexible electronics have **unblocked the power bottleneck** as wearable technology is fueled by biobatteries that mainly take the shape of implanted glucose fuel cells.

2. The miniaturization and performance of electronic components have reached levels that make for the construction of **invisible technology**, blending in seamlessly with the human body. As natural language processing, voice and gesture control technologies have matured, human-machine interaction and inter-human communication have assimilated and the notion of user interfaces gradually loses meaningfulness.

3. The clash of titans has come to a conciliatory end: Consumer electronics powerhouses see their **supremacy threatened** by rapid and disruptive hardware and software innovations, predominantly brought about by an unprecedented breed of "holistic technology" startups.

4. The current state of the market for wearable technologies is characterized by a high degree of **fragmentation** with **competition** approaching from all directions. It has become a common practice for component suppliers to compete directly with their customers (tech vendors) by investing in start-ups and leveraging their technological competences to build and market finished products on their own.

5. Giving in to the intensified competitive pressure, Apple and Google had found themselves constrained to answer the call for more **flexibility of software ecosystems**. Open innovation has finally gotten the better of closed system thinking. Open source operating systems and open APIs have become the industry standard, which initiated a paradigm shift towards hardware agnostic software development.

Perception of Value

1. Over the previous years, wearable tech vendors have been consistently demonstrating their ability to cater to evolving and rapidly diversifying consumer needs and preferences thereby fostered **mainstream adoption** and long-term engagement.

2. Wearable technology has catapulted the contextualization of content and services onto the next level. The all-encompassing collection and analysis of large volumes of data **(Big Data)** inspires a quantification of all aspects of life, which resonates well with a deeply entrenched human drive to **optimize everything** from people's health and their impact on the environment to the efficiency of work and manufacturing processes.

3. The pervasive use of technology has also evoked a sense of **technology embodiment**: Humans regard technology as an extension of their bodies and self. Thereby, consumers avail themselves of wearable gadgets as a vehicle for **identity expression**. As a result, the extent to which technology reflects a person's status, style, values or beliefs has emerged as the major emotional selling proposition in consumer electronics.

Market Attractiveness

1. The **tech divide has softened**: Consumers, on the other hand, have in large part **shed privacy concerns** and exhibit greater trust in the intentions of novel technologies. The gap that had separated digital natives from digital immigrants has greatly shrunk.

2. The remaining current of tech resistance is primarily associated with an increased diffusion and magnitude of **technology-induced societal grievances** such as social isolation as well as new kinds of emotional and mental diseases.

3. It has become common practice for technology companies to join forces with leading firms from adjacent industries, particularly in the form of healthcare fusions or fashion collaborations. Building on such **cross-industry partnerships**, small firms thrive in profitable niche markets.

4. Wearable technology pervades all imaginable **vertical markets**, revolutionizing entire industries (e.g., healthcare, insurance, construction, professional sports) while expediting the rise of smart homes and smart cities.

Appendix III: Coding Agenda – Environmental Frames

Category	Definition	Coding Rules	Anchor Examples
Attention Focus	The area of the environment that managers emphasize the most and consider the most important when analyzing the effect of environmental conditions on their business models	Area is mentioned in at least one of the following contexts: ▪ Specific mentioning of importance of that area ▪ Repeated emphasis on that area ▪ Formulation of specific goals in that area	▪ The business environment that I am sensitive to is the competition. ▪ I can't believe that there is a lot of products out in the market place that consumers just don't want to wear. ▪ It is my goal to win more customers and to not lose any customers to my competition.
Winning Recipe	The key success factors and efforts that determine who will be successful in a respective industry	Factor is mentioned in at least one of the following contexts: ▪ In relation to the future outlook of the industry and consumer adoption ▪ As part of what has gone wrong in the industry so far ▪ In connection with a firm's competitive advantage	▪ So you want to start making technology products that people want to put on their body; that they think are fashionable. And that's where I think wearable technology right now is just totally off course. ▪ Company C has to be different in order to succeed and right now there is nothing in the market like it. So we still have an advantage here.

Scope of Analysis	The variety and scope of environmental areas that managers consider when analyzing the effect of environmental conditions on their business models	Area is mentioned in at least one of the following contexts: ▪ Area has been addressed in relative detail ▪ Specific opinions have been voiced regarding the developments in that area ▪ Manager establishes direct link between area and business model	▪ Another aspect is the fact that a lot of simple phones today are really old. When we think of simple phones today, it is the feature phone. But that is not a very modern approach to the idea of a simple phone. So with the rise of smartphones there has grown a stage for a new concept of simple phones. ▪ The technological aspect of that is that for the first time every chip sets are really small. And we can do new cool things with them.
Causal Logics	The managers' general understanding and interpretations of the way in which their business models are interlinked with the business environment	Environmental interpretation is mentioned in at least one of the following contexts: ▪ Assessment of opportunity vs. threat ▪ In relation of locus of control and dependence ▪ With regards to following or reacting to environmental events	▪ We are following a market. We can adapt our technology to pretty much anything that's out there and whether that's a mobile phone or a tablet or a laptop. ▪ They will try to utilize their platforms, software, algorithms as leverage against me from increasing market growth. There is not much I can do about it as a brand.

Appendix IV: Coding Agenda – Business Model innovation Schemas

Category	Definition	Coding Rules	Anchor Examples
Role in the firm	The significance that managers ascribe to business model innovation in terms of how it relates to broader strategic decision-making in the firm	Statement is voiced in at least one of the following contexts: ▪ Relationship of business model innovation and strategic decision-making ▪ Detail and frequency of considerations regarding business model innovation	▪ I am always thinking about the revenue streams and how we can make more money off of Company C. ▪ I am not trying to fool myself here. Even now, we change out business model quite often.
Planned Outcome	The goal a manager envisages when engaging in business model innovation in terms of how operations and strategy should change as a result	Statement is voiced in at least one of the following contexts: ▪ Hypothetical ideas concerning the future effect of business model changes ▪ Opinions on how the business model should evolve in response to changing conditions	▪ If we were making fridges and TVs in a 150 years from now, the think that Company A would have to do to continue to cut the edge would be that heritage and history of being a brand with integrity and reliability. ▪ It would be more software-based. Basically, the vortex of change you are describing says that Company C is going to be used more intensely on a much more intimate level.

Scope	The variety and scope of business model dimensions that managers consider when engaging in business model innovation	Dimension is mentioned in at least one of the following contexts: ▪ Hypothetical ideas for how to change the business model in the future ▪ Considerations of resources that could be exploited to react to changing conditions	▪ What we will certainly have to change in this "Vortex of Change" is that we become more of a lifestyle product ▪ If we look at ecosystems for our product, the most critical consists of the type of portals that integrate data from different parties and allow you to consolidate and compare your fitness data across time and with your peers.
Process	The nature of all measures related to business model innovation in terms of frequency, timing and degree of novelty	Statement is voiced in at least one of the following contexts: ▪ General or exemplary description of business model innovation approach ▪ Evaluation and justification of the model innovation approach	▪ Despite us being a startup we still rely on a gradual step-by-step approach and do not change completely from one thing to the other. ▪ But it's a really good way to fact check what our thinking is, if we can come up with assumptions and base our actual learnings on what other companies have done.